CHEMICAL LIBRARY

The American Pharmaceutical Association, the A. A. C. P., the N. A. B. P. Will Meet in Baltimore during the Week of May 5th, Emerson Hotel. The National Conference Pharmaceutical Research, the Plant Science Seminar, the U. S. P. Convention, in Washington, during Week of May 12th—See Your Railroad Agent for Rates on Certificate Plan, Now!

Vol. XIX, No. 4 APRIL, 1930

JOURNAL

OF THE

AMERICAN PHARMACEUTICAL ASSOCIATION

TRADE MARK

APR 28 1930

CONTENTS

Frontispiece and Sketch—H. C. Christensen 315
Editorial:
A Step in Progress of National Legislation in Which Pharmacists Are Interested 317
Pharmacy in the Field of Public Health 318
Publicity for the U. S. Pharmacopœia, the National Formulary and the New and Nonofficial Remedies 319
Scientific Section:
The Heats of Formation of the Alcoholates of Chloral—Chechik 320
Studies of Astringency—Theis 326
A Study of the Stability of Solution of Arsenous and Mercuric Iodide, U. S. P. X—Husa and Enz 328
The Preparation of Cyclopropane—Lott and Christiansen 341
A Thought on the Place of Volatile Oils in Plant Economy—Marsh and Maus 344
A Pharmaceutical Study of Hydrastis Canadensis—Hirose and Langenhan 349
The Bioassay of Epinephrine-Procaine Mixtures—Munch and Deckert 354
Amino Alcohols. 3.—The Potentiation of the Pressor Action of Epinephrine by Arylpropanolamines—Munch and Hartung 356
The Bellier Test for Sesame Oil—Cook 361
The Acid-Base Equilibrium of Tincture of Digitalis—Krantz, Jr. 366
Suggestions Relative to U. S. P. X Revision—Bebie 371
Bibliography of Pharmaceutical Research—DuMez 375
Production and Distribution—McFall 377
Department of Business Management:
What Is New in the Price Situation?—Olsen 380
A National Pharmacy Welfare Fund—Swallow 383
Why Candidates Fail State Board Examinations—Raabe 384
The Department of the American Association of Colleges of Pharmacy:
A New Faculty Member—Philip 388
Student Branches of American Pharmaceutical Association—Christensen 390
Resolutions Passed at the Joint Meeting of Boards of Pharmacy and Colleges of Pharmacy of District No. 2, March 24 and 25, 1930, at Washington, D. C. 393
Completion of the Junior College the Next Prerequisite—Wulling 394
Abolishing the Assistant Grade—Winne 397
Historic and Interesting Places of Baltimore, the A. Ph. A. Convention City 398
The Department of the National Association of Boards of Pharmacy 399
Proceedings of the Local Branches 404
Editorial Notes 410
Personal and News Items 412
Obituary 415
Societies and Colleges 416
Legal and Legislative 424
Book Notices and Reviews 426
Advertising—Cover pages 2, 3 and 4 and pp. I–XXVIII.

Published Monthly by the American Pharmaceutical Association: Office of publication, 20th & Northampton Sts., Easton, Pa. Editorial Office, 10 West Chase St., Baltimore, Md.

Annual Subscription, $4.00; Single Numbers, 35 Cents.

THE 78th ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION WILL BE HELD IN BALTIMORE, DURING WEEK OF MAY 5, 1930.

The 1930 Meetings of the American Association of Colleges of Pharmacy, the National Association of Boards of Pharmacy, Conferences of Pharmaceutical Association Secretaries and of Pharmaceutical Law Enforcement Officials will also be held at Baltimore, same time and place.

Local Secretary—Samuel Y. Harris, Lombard & Poppleton Sts., Baltimore, Md.

For Association Roster and Roster of the Boards of Pharmacy, of Officers of Pharmaceutical Associations, Local Branches, see pages x, xii, xiv, etc.

Entered as second-class Matter, January 23, 1917, at the Post Office at Easton, Pa., under the Act of March 3, 1879. Acceptance for mailing at special rate of postage provided for in section 1103. Act of October 3, 1917; authorized July 10, 1918.

The Particular Liver Extract
Made by Fairchild Bros. & Foster
Is issued as

Hepcentrate

The title Hepcentrate, coined from hepar and concentrate, is adopted to distinguish this product which is a *complete concentrate* of the water-soluble constituents of the liver, nitrogenous extractive and mineral—freed from coagulable protein and lipoid.

Hepcentrate is not a chemically fractionated portion of an aqueous extract of the water-soluble constituents.

Hepcentrate affords a true alternative for the liver itself in pernicious anemia; and this under clinical trial now for some two years by many physicians in many places. It is, we believe, the most acceptable and tolerable liver extract.

Hepcentrate is put up in boxes of 20 vials, the contents of each vial representing 100 grams of fresh liver.

Fairchild Bros. & Foster - - New York

TRADE MARK
PERALGA

The Efficient, Rational Analgesic-Sedative

Always keep an adequate supply of PERALGA on hand—be prepared to meet the ever-growing demand from customers who have been instructed by Physicians and Dentists as to its beneficial action and far-reaching usefulness.

Doctors particularly approve PERALGA as a Non-Narcotic, Non-Hypnotic, Non-Habit-Forming Analgesic-Sedative employed mainly in "Headaches" especially those occurring in Menstrual and Climacteric Disorders, Hysteria, Mental and Physical Exhaustion, Migraine, Eyestrain, also in Insomnia due to Pain.

Dentists enthusiastically support PERALGA to allay pre-operative and post-operative pain and to literally ease the path to and from the dental chair by rendering the patient calm, comfortable and relaxed throughout the session.

Every co-operation is being tendered you by extensive advertising in the professional press and by a continual distribution of complimentary packages to the Medical and Dental Professions, Hospitals, and Public Institutions.

It will be profitable for you to push PERALGA.

Your wholesaler will promptly supply you.

S. & G. Products—*"Safe and Guaranteed"*

SCHERING & GLATZ, Inc.

84-92 Orange Street
BLOOMFIELD, N. J.

41-43 Maiden Lane
NEW YORK, N. Y.

The Trade-Mark "PERALGA" is registered in the U. S. Pat. Off. under No. 160960.

AN INVITATION AND A MESSAGE FROM THE PRESIDENT OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

THE founders of the AMERICAN PHARMACEUTICAL ASSOCIATION dedicated it to the betterment of pharmaceutical service for the people of our country and to their protection against impure, sub-standard and dangerous drugs and medicines. The ASSOCIATION has permitted nothing to swerve it from this duty and under its leadership, pharmacy may claim to have discharged its responsibility as one of the professions charged with the preservation and improvement of the public health.

H. A. B. DUNNING.

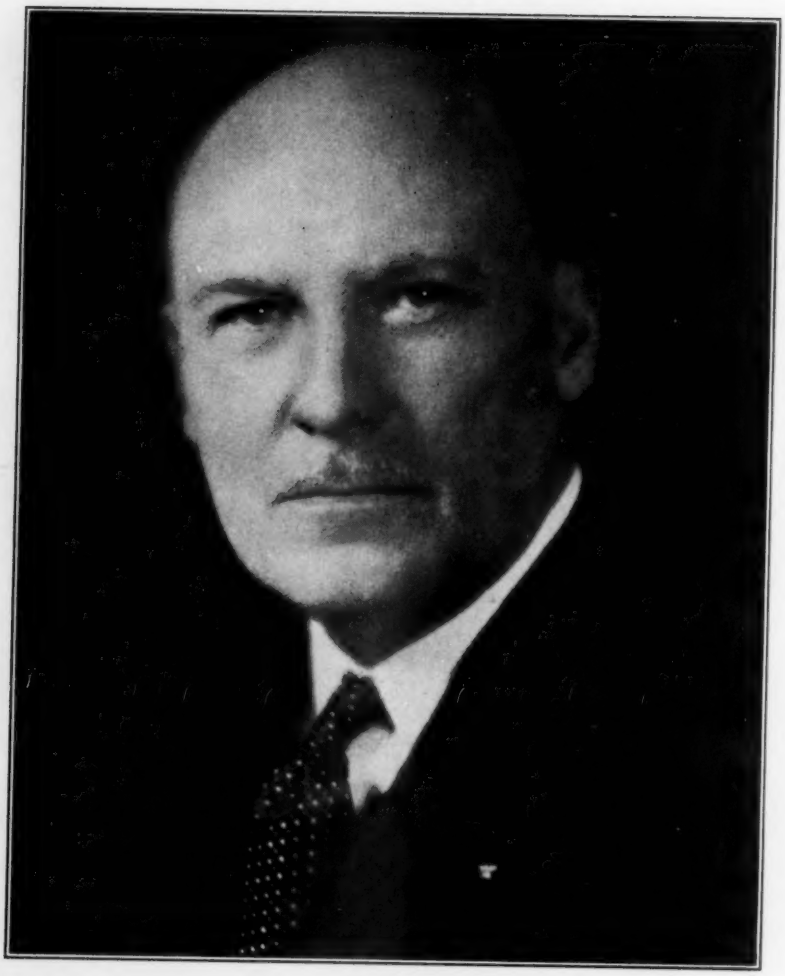
Seventy-seven annual meetings of the ASSOCIATION have now been held and an examination of their proceedings will show that at each of them, constructive steps have been taken for the advancement of pharmacy.

The Seventy-Eighth meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION will be held in Baltimore during the week of May 5th, followed by the United States Pharmacopœial Convention in Washington. It has been thirty-two long years since the ASSOCIATION met in Baltimore, but the interest of we Baltimoreans has never lessened and a sincere welcome will be accorded our guests.

It will be my privilege to preside over this meeting in my home city. For my fellow pharmacists of Maryland, and for myself, I wish to extend a cordial invitation to pharmacists everywhere to join with us in making this a successful meeting and in promoting the further advancement of our calling.

H. A. B. DUNNING.

April 1930.



H. C. CHRISTENSEN.

JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION

OL. XIX APRIL, 1930 No. 4

THE PRESIDENT-ELECT OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Henry C. Christensen, the son of Danish parents, was born December 10, 1865, in Southeastern Wisconsin. About this time Nebraska, recently admitted as a state (1867), attracted a large number from the Badger State, among them the family of Hans S. and Catherine Christensen. Settling in Kearney County, the son assisted in establishing a home for the family, and during the winter months of succeeding years he attended school, supplementing the education received in the public school of his former home at Union Grove, Wis. During the summer months of these years Henry was employed in a general store and then followed four years of apprenticeship in the L. M. Copeland Pharmacy at Minden. He then matriculated at the School of Pharmacy of Northwestern University and graduated with honors in 1893, receiving the pharmaceutical laboratory prize. We have before us the *Minden* (Nebraska) *Gazette*, of February 23, 1893, in which the regard of Mr. Christensen's home town is expressed with the hope that he would return there; however, the young man decided to open a pharmacy in Chicago and during the same year also entered a life partnership. Mr. and Mrs. Christensen have two daughters, who have attended several of the annual A. PH. A. meetings. One of the daughters is a student at the University of Chicago.

The *Chicago Transcript*, of March 1, 1900, speaks of Mr. Christensen's success, and of his pharmacy as reflecting credit upon the proprietor—the substance is quoted in saying that "he is a type of successful man, worthy the esteem, confidence, friendship and patronage; with excellence of method he combines commendable consideration of those with whom he comes in contact." He remained in business at this locality from 1893 to 1911.

In 1907, Governor Charles S. Deneen, now senior senator from Illinois, appointed Mr. Christensen a member of the Illinois Board of Pharmacy, and he has been reappointed each year by succeeding governors, with the exception of 1915,

until 1921. In 1914, he was elected secretary of the National Association of Boards of Pharmacy and reëlected each year since then. The work of that organization has been progressive, and has contributed largely not only to the educational program but also to the betterment of pharmacy laws and the promotion of legislation, which in one way or another have a bearing on pharmacy. Secretary Christensen is chairman of the Advisory Examination Committee of the National Association of Boards of Pharmacy. He gives much time to the District Meetings in which the coöperative work of the colleges and boards finds expression and action.

The President-Elect firmly believes there is a bright future for pharmacy, which will be strengthened by higher educational standards, demanding a four-year college course in pharmacy, requiring foundation in theory, and laboratory training that will take the place of the former apprenticeship, and adequate business training in the fundamentals. He realizes the need of sales other than of medicines in stores but these should as far as possible have a relation, and not grossly detract from the dignity of the profession.

Secretary Christensen became a member of the AMERICAN PHARMACEUTICAL ASSOCIATION in 1906; he is a member of the Council and has served on a number of important ASSOCIATION committees. He takes an active part in the Chicago Branch A. PH. A. and, while engaged in the retail business, held membership in other national and local associations; he is vice-president and member of the Executive Committee of the National Drug Trade Conference; secretary-treasurer of the Drug Trade Bureau of Public Information, and member of the American Association for the Advancement of Science.

The subject of this sketch holds a number of fraternal and club affiliations—he is a member of the Masonic Order, the Independent Order of Foresters of Canada, Isaak Walton League of America, and honorary member of the Kappa Psi pharmaceutical fraternity; Chicago Club, Hamilton Club, Collegiate Club of Chicago, Northwestern University General Alumni Association, and member of the Board of Directors of the latter organization. Life out-of-doors, hikes through the country which offer opportunity for nature study, provide his diversion.

In 1923, the Philadelphia College of Pharmacy and Science conferred the degree of Master in Pharmacy on Mr. Christensen. In his accession to office the ASSOCIATION and pharmacy have assurance for continued progress and, in a spirit of coöperation, best wishes for a successful year are extended.

THE BALTIMORE FLAG HOUSE, 1793—BIRTHPLACE OF THE "VICTORY FLAG" OF FORT McHENRY, 1814.

The Star-Spangled Banner Flag House, shown in this cut, is open every day, except Sunday, from 10:00 A.M. to 5:00 P.M. "It was the home of Mary Young Pickersgill, maker of the Star-Spangled Flag of Fort McHenry, and Rebecca Young, who made the first flag of the Revolution under General Washington's direction." In it are exhibited pictures, portraits and relics of the eventful period of about 1812.

EDITORIAL

E. G. EBERLE, EDITOR 10 West Chase St., BALTIMORE, MD.

A STEP IN PROGRESS OF NATIONAL LEGISLATION IN WHICH PHARMACISTS ARE INTERESTED.

PHARMACISTS have actively supported the Parker Bill, which aims to coordinate Government public health activities, gives more specific statutory authority for certain activities of the Public Health Service and broadens some of its activities; changes the name of the Advisory Board for the Hygienic Laboratory to that of "National Advisory Health Council," and increases the laboratory's personnel and divisions. It increases the pay of the Surgeon General and places the dental, sanitary engineer and pharmacist officers of that service on the same basis as to appointment, pay, promotion, disability privileges, etc., as medical officers. In making the report Congressman Mapes said, in substance, that "this is one of the major objects of the bill. Public health work is, or should be, a career service. It has come to be quite as dependent upon these other professions for its success as upon the medical profession. For the good of the service and to encourage members of these other professions to engage in it, it is considered necessary that they should be put upon the same basis as the doctors." Surgeon General Cumming testified: "The greatest single administrative need of the Public Health Service is uniformity of method of appointment and status of this scientific personnel."[1]

The amendments made to the Bill have the approval of the Surgeon General, and do not concern the pharmacist; as amended the [illegible] as passed both Houses of Congress and is now in the hands of the President [illegible] Surgeon General has on a number of occasions expressed his opinion [illegible]ative to the important services of pharmacy, and as this is the first time in a number of [illegible] that pharmacists have had any recognition in national legislation, [illegible] and hopeful that other pending bills will be successfully carried forwa[illegible]

PHARMACY IN THE VETERANS' BUREAU.

Recently, Representative Johnson of South Dakota, chairman of the Committee on World War Veterans' Legislation, introduced a bill into Congress (H. R. 6996) providing for a commissioned medical service in the Veterans' Bureau. This measure provides for a Medical Corps, a Medical Reserve Corps, a Dental Corps, a Dental Reserve Corps and a Nurse Corps. At present, physicians, dentists and nurses as well as pharmacists in the Bureau are appointed under the Civil Service regulations and are civilian employees.

President H. A. B. Dunning, Chairman of the Council S. L. Hilton and Secretary E. F. Kelly, representing the AMERICAN PHARMACEUTICAL ASSOCIATION, A. G. DuMez, representing the American Association of Colleges of Pharmacy, and R. L. Swain, representing the National Association Boards of Pharmacy, appeared before the Sub-Committee on Medical Personnel of the Committee on World War

[1] The Parker Bill discussed in the foregoing will be found in the February JOURNAL, pages 202–204. Specific attention is called to Sections 4, 5, 9(*b*) and 13.

Veterans' Legislation and presented statements in support of amendments to H. R. 6996 to also provide for a Pharmacy Corps and a Pharmacy Reserve Corps—to have charge of the purchase, testing, transportation, storage, preparation and dispensing of the drugs, medicines and allied materials used in the medical and surgical treatment of the veterans. The suggested amendments provide that the Pharmacy Corps be under the direction of a pharmacy director with the corresponding rank of Colonel, and that there shall be a sufficient number of commissioned pharmacists with corresponding rank from Lieutenant-Colonel to First Lieutenant to carry on the pharmaceutical service in the various dispensaries and hospitals of the Veterans' Bureau.

The purpose of the proposed legislation, to improve the entire medical service given to veterans, was endorsed by the representatives of pharmacy who strongly supported a separate Pharmacy Corps.

It was brought out during the hearing that the pharmaceutical service in the more than sixty hospitals of the Bureau, with their thousands of patients, was a great and most important undertaking; that the organization proposed did not represent a new outlay, as the Bureau now has in its employ about sixty pharmacists, but rather a regrouping of them to better discharge their duties; and that the Bureau could not expect to secure the services of those qualified to render the best obtainable pharmaceutical service unless the recognition and salary were proportionate. Evidence was submitted indicating that the present service was in need of improvement. Data was given to show that pharmacists in civil life discharging duties corresponding to those proposed for the officers of the Pharmacy Corps received salaries fully as high as those provided for in the amendments, and that the salaries now being received by pharmacists in the Bureau were lower than those received by pharmacists in civil life.

Attention was drawn to the educational requirements now in effect, to the professional status of pharmacy in civil life, which has shown great advancement in recent years, and to the protection thrown around the practice of pharmacy by the laws of each state in the union. The representatives of pharmacy were assured that the proposed amendments and the entire question of pharmaceutical service would receive the careful study of the committee and the officials of the Veterans' Bureau.

PHARMACY IN THE FIELD OF PUBLIC HEALTH

DR. Theodore B. Appel, of the Pennsylvania Board of Health, in a recent address[1] spoke of the general profession of Pharmacy and its relation to society at large as represented by the field of public health. Extracts from the address will serve the purpose of editorial comments.

Dr. Appel said that "Pharmacy embraces the entire field from the procuring or production of the raw materials to the retailing of them to the customer. It involves research of the most painstaking kind. It calls for proper standardization and protection from adulteration of the drugs or other materials used. Pharmacy as a profession must always be on guard."

The speaker referred to the clinical laboratory for discoveries of the causes of

[1] Founders Day, Philadelphia College of Pharmacy and Science.

disease and suggestions of remedies and means of prevention, and to the pharmaceutical laboratory where the remedy is made available for practical use, standardization and safe-keeping, and he illustrated the statements—"Insulin was found to be of value in the treatment and control of diabetes, but the manufacturing pharmacist made it available for practical use. The ingestion of liver is necessary to prevent the ravages of pernicious anæmia and again the laboratories of pharmacy produced extracts increasing the power of control." Dr. Appel added a number of other illustrations. Commenting thereon he said: "These achievements are all of admitted importance to Public Health, but to my mind the retail pharmacist, if he be a true student of his profession has the greatest opportunity. He is continuously in contact with the public, and his opportunity by advice to aid in the education of the public is unlimited. True, to do this he must be a real student and must be familiar with his wares." He continued: "And going further, the pharmacist is a member of a profession of high ideals and great possibilities. Each individual owes a certain debt to society as a whole and it seems to me in view of the ideals of his profession and his own knowledge, that the pharmacist is well equipped to take his stand in the line of battle for general public health and do his part in molding public opinion along proper lines. In this way he renders to society the debt he owes it." We have in this address a statement relative to the activities of the pharmacist and his standing as member of a time-honored profession and the importance of his service in the field of public health.

PUBLICITY FOR THE U. S. PHARMACOPŒIA, THE NATIONAL FORMULARY AND THE NEW AND NONOFFICIAL REMEDIES.

The Chicago Medical Society and the Chicago Retail Druggists' Association are coöperating in plans to extend the use of the U. S. Pharmacopœia, National Formulary, and the "New and Nonofficial Remedies." The *Chicago Tribune*, of March 20th, reports a meeting at the Jackson Park branch of the Chicago Medical Society, held in honor of O. U. Sisson, chairman of the Chicago Retail Druggists' Association for promoting the use of the U. S. Pharmacopœia and National Formulary and Dr. James H. Hutton, president-elect of the Chicago Medical Society.

The plan was presented for the Society's approval at the meeting held in Billings Memorial Hospital, of the University of Chicago. It was brought out that about 12 million prescriptions were written annually in Chicago and quite a percentage of them are extra-pharmacopœial preparations, not of the National Formulary nor of the " N. N. R." It is the purpose, as stated, to enlist coöperation of physicians and pharmacists and it is hoped thereby to reduce the number and variety of preparations necessary to be kept in the pharmacists' stocks, and better acquaint physicians with the products, which make for greater uniformity in prescribing and compounding.

Baltimore expects you during the week of May 5th for the meetings of the AMERICAN PHARMACEUTICAL ASSOCIATION, the American Association of Colleges of Pharmacy and the National Association of Boards of Pharmacy—Headquarters—the Emerson Hotel.

SCIENTIFIC SECTION

THE HEATS OF FORMATION OF THE ALCOHOLATES OF CHLORAL.

BY SAMUEL CHECHIK.*

INTRODUCTION.

As is well known, anhydrous chloral combines not only with water to form chloral hydrate, regarded structurally as trichlorethyledene glycol, but also with alcohol to form chloral alcoholate,[1] the monoethyl ether of trichlorethyledene glycol,[2] also regarded as its hemiacetal. Other alcohols are known to form similar addition products.[3] Because of the readiness with which some of these are formed, also because of the sharp or fairly sharp melting points of a few of these addition products, they have been used to identify the respective alcohols. Bromal and its addition products[4] have been used for a like purpose.

Thus far, however, the use of these two reagents appears to have depended largely upon accidental discovery.[5] No systematic study of the additive capacity of either chloral or bromal for alcohols, monatomic, diatomic,[6] triatomic,[7] etc., seems

---

* Scientific Section, A. PH. A., Rapid City meeting, 1929.

[1] The discovery of chloral hydrate and of chloral alcoholate was coincident with that of chloral, first prepared by Liebig in 1832 (*Ann.*, 1, p. 182. See also "Cohen, Org. Chem.," p. 140), though he did not recongize the alcoholate as a distinct substance at that time. Personne is accredited with the observation, in 1869, that by the addition of ethyl alcohol to chloral a different substance is formed than that which results when water is added. (*Compt. rend.*, 69, p. 1363; J. (1869), p. 504.) During the same year, Roussin had found that a crystalline mass is formed when alcohol is acted upon by chlorine as in the preparation of chloral (*Compt. rend.*, 69, p. 1144; J. (1869), p. 504). This is chiefly chloral hydrate. In 1870, hence a year later, Lieben in his report "Ueber die Einwirkung von Chlor auf absoluten Alkohol" pointed out that choral alcoholate is formed as a by-product in the preparation of chloral hydrate (*Ber.*, 3, p. 907).

[2] The structure of chloral hydrate as trichlorethyledene glycol was first pronounced by Caro and Victor Meyer in 1880. (*Ber.*, 13, p. 2343; see also Meyer u. Jacobsen, I (II), p. 867.) That chloral alcoholate should be regarded as the hemiacetal or monoethyl ether of trichlorethyledene glycol followed.

[3] In his paper "Ueber die Alkoholderivate des Chlorals," Henry in 1874 discusses the addition products formed by the union of chloral, not only with water, but with the following alcohols as well, *viz.* CH_3OH, C_2H_5OH, $C_5H_{11}OH$, $C_2H_4(OH)Cl$, $C_2H_2O(OH)C_2H_5O$, $CH_2(OH)$-$CH_2(OH)$. (*Ber.*, 7, p. 762.)

[4] The fact that bromal behaves like chloral in this respect was first recorded by Minguin in 1893 (*Compt. rend.*, 116, p. 889).

[5] 1869. Ethyl alcohol, Personne, *Compt. rend.*, 69, p. 1363.
1870. Methyl alcohol, Martius and Mendelssohn-Bartholdy, *Ber.*, 3, p. 443.
1871. Amyl alcohol, Jacobsen, *Ann.*, 157, p. 243.
1871. Cetyl alcohol, Jacobsen, *Ibid.*
1874. Allyl alcohol, Oglialoro, *Ber.*, 7, p. 1462.
1883. Thymol, Mazzara, *Gaz.*, 13, p. 272.
1891. Borneol, Heller, *Compt. rend.*, 112, p. 144.
1901. Propyl alcohol, Gabutti, *Gaz.*, 31, I, p. 86.
1901. Isopropyl alcohol, Gabutti, *Ibid.*

[6] Glycol, Henry, *Ber.*, 7 (1874), 762. Resorcinol, H. Causse, *Bull. Soc. Chim.* (3rd ser.), 3 (1890), p. 861.

[7] Glycerol.

to have been recorded.[1] A mere beginning has now been made by studying the heats of formation of the hemiacetals resulting by bringing together molecular amounts of anhydrous chloral and the alcohols of the methanol series, from the point of homology as well as that of isomerism.

For this purpose 3.2 cc. of anhydrous chloral (= 5 Gm.) freshly prepared and kept in a well-stoppered bottle, were mixed with equimolecular amounts of the respective alcohols in a double tube stoppered with a thermometer and the rise in temperature observed, also the time required to reach the maximum temperature. In addition the time required for the cooled reaction product to crystallize was recorded, also the melting point of the crystallized mass.

Methyl Alcohol.—The monomethyl ether of trichlorethyledene glycol was first prepared by Martius and Mendelssohn-Bartholdy in 1870.[2] In the next year it was prepared by Jacobsen.[3] He records its m. p. at 50° and its b. p. at 106°. In 1874 Henry[4] again reports having prepared this compound but he also reports no melting point.

To 3.2 cc. of chloral 1.4 cc. (= 1.14 Gm.) of methanol ("Absolute," E. & A.) were added. The temperature rose 56.9° (56.7°, 56.9° and 57.2°) in 6 seconds. (The three readings were 7, 6 and 6 seconds, respectively.) The reaction mixture crystallized on cooling. The product melted at 51.5°. It remained crystalline after seven months. After that time it was found to be insoluble in cold heptane, but soluble in hot heptane. From the hot solution it crystallized upon cooling. The recrystallized product melted at 46°. Recrystallized a second time from hot heptane, its melting point remained the same. The m. p. of chloral hydrate is reported as 57°. The m. p. of about 51° as reported above, may have been due to traces of chloral hydrate since the "absolute" methyl alcohol used, no doubt, contained traces of water.

Ethyl Alcohol.—The preparation of chloral alcoholate by Liebig[5] (1832), Personne[6] (1869), Roussin[7] (1869) and Lieben[8] (1870) has already been referred to.[9] Jacobsen[10] (1871) states that it melts at 56–57° and boils at 115–117°. ("Richter, Org. Chem.," 1st edition, p. 196) states that it melts at 56° and boils at 114–115°.

To 3.2 cc. of chloral 1.94 cc. (= 1.57 Gm.) of absolute ethyl alcohol (manufactured in the laboratory; d = 0.816) were added. The temperature of the reaction mixture rose 61.2° (61.0°, 61.2° and 61.4°) in 11 seconds. (The three readings were 12, 10 and 10 seconds, respectively.) Crystallization set in upon cooling. The product melted at 55° to 58°. After having stood for half a year, it was found to be insoluble in cold, but soluble in hot heptane. From the hot solution it did not crystallize immediately upon cooling, but only after long exposure to cold. The recrystallized material melted at 61°. A second recrystallization from heptane caused a lowering of the melting point to 57°. These fluctuations are not readily explained.

Propyl Alcohols.—The addition products of neither the primary nor the secondary propyl alcohols appear to have been prepared.

Primary Propyl Alcohol.—To 3.2 cc. of chloral, 2.54 cc. (= 2.05 Gm.) of a commercial article (E. & A.) obtained from stockroom were added. The rise in temperature amounted to 62.9° (63.3°, 62.9° and 62.6°) in 7 seconds (6, 7 and 6 seconds, respectively.) The product remained liquid after six months' standing.

Secondary Propyl Alcohol.—The alcohol used was that of the stockroom (E. & A.). The rise in temperature amounted to 53.7° (54.0°, 53.7° and 53.5°) in 11 seconds (10, 12 and 11 seconds,

---

[1] An attempt in this direction is recorded as an undergraduate thesis by Lloyd T. Plank, "The Addition of Alcohols to Chloral," U. W., 1927, unpublished results.

[2] *Ber.*, 3, p. 443. [3] *Ann.*, 157, p. 243.

[4] *Ber.*, 7, p. 762.

[5] *Ann.*, 1, p. 182.

[6] *Compt. rend.*, 69, p. 1363; *J.* (1869), p. 504.

[7] *Compt. rend.*, 69, p. 1144; *J.* (1869), p. 504.

[8] *Ber.*, 3, p. 907. [9] See Introduction, footnote 1.

[10] *Ann.*, 157, p. 243.

respectively, in the three experiments). The product crystallized upon cooling. The crystals melted at 47°. They were soluble in heptane at room temperature from which solvent they were obtained after prolonged standing in the cold as fine needles melting at 49°. A second recrystallization from heptane gave a product with the same melting point.

Butyl Alcohols.—Not one of the addition products of the four isomeric alcohols appears to have been prepared.

Primary Normal Butyl Alcohol.—To 3.2 cc. of chloral, 3.1 cc. (= 2.74 Gm.) of a *n*-butyl alcohol from the stockroom (Industrial Chem. Co., Balto.) were added. The rise in temperature was 58.1° (57.6°, 58.8° and 58.0°) in 10 seconds (9, 10 and 10 seconds, respectively, in the three experiments). The reaction product solidified in 15 minutes. It melted at 58.5°. It was found to be soluble in cold heptane. The m. p. of the recovered crystals was 56.5°. A second recrystallization from the same solvent yielded a product with the same m. p.

Primary Iso Butyl Alcohol.—To 3.2 cc. of chloral, 3.1 cc. (= 2.50 Gm.) of *p*-isobutyl alcohol from the stockroom (Merck & Co.) were added. The temperature rose 57.2° (56.7°, 58.0° and 57.0°) in 10 seconds (11, 10 and 10 seconds, respectively). After standing for four months the reaction product was still liquid. It was soluble in heptane, from which solvent no crystals have been obtained after three weeks. The solution had a yellowish color.

Secondary Butyl Alcohol.—To 3.2 cc. of chloral, 3.05 (= 3.03 Gm.) of *s*-butyl alcohol from the stockroom (manufacturer unknown) were added. The temperature of the reaction mixture rose 52° (51.6°, 52.0° and 52.4°) in 7.5 seconds (8, 7 and 8 seconds, respectively). After standing for four months it was still liquid.

Tertiary Butyl Alcohol.—To 3.2 cc. of chloral, 3.2 cc. (= 2.5 Gm.) of *t*-butyl alcohol from the stockroom were added. The rise in temperature was 14.75° (13.5°, 15.0° and 15.2°) in six minutes ($4^1/_2$, 6 and $7^1/_2$ minutes, respectively). The reaction mixture solidified over night. It melted at 58°. It was insoluble in cold heptane but soluble in the hot solvent. After prolonged standing crystals were obtained that melted at 52°.

Amyl Alcohols.—Of the eight isomeric alcohols (isomers of position, exclusive of optical isomers) only one appears to have been used in the preparation of an addition product. No doubt, the commercial amyl alcohol was used. It was first reported by Martius and Mendelssohn-Bartholdy[1] in 1870. In the next year Jacobsen[2] reports a m. p. of 56° and a b. p. of 145–147°. Henry,[3] in 1874, also prepared it.

The alcohols used in the experiments here recorded were obtained from Eastman.

Primary Normal Amyl Alcohol.—To 3.2 cc. of chloral, 3.7 cc. (= 3.02 Gm.) of the alcohol were added. The temperature of the reaction mixture rose 50.6° (50.0°, 49.7° and 52.2°) in seven seconds (7, 7 and 7 seconds, respectively). It was still liquid after having stood four months. The reaction product was of a dark brown color.

Primary Iso Amyl Alcohol.—To 3.2 cc. of chloral, 3.7 cc. (= 3.03 Gm.) of the alcohol obobtained were added. The temperature of the reaction mixture rose 56.5° (55.5°, 56.5° and 57.7°) in seven seconds (8, 7 and 8 seconds, respectively). It solidified after standing two days. It melted at 55°. It was insoluble in cold heptane, but soluble in hot heptane. After prolonged standing crystals were obtained that melted at 55°. The recrystallized product had the same m. p.

Secondary Normal Amyl Alcohol (*Methyl n-Propyl Carbinol*).—To 3.2 cc. of chloral 3.7 cc. (= 3.05 Gm.) of the alcohol were added. The temperature of the reaction mixture rose 53.4° (52.7°, 53° and 53.7°) in seven seconds (7, 9 and 7 seconds, respectively). After standing four months it was still liquid.

Secondary Normal Amyl Alcohol (*Diethyl Carbinol*).—To 3.2 cc. of chloral, 3.7 cc. (= 3.05 Gm.) of the alcohol were added. The temperature of the reaction mixture rose 42.9° (43.0°, 42.2° and 43.5°) in eleven seconds (11, 12 and 11 seconds, respectively). After four months it was still liquid.

Tertiary Amyl Alcohol.—To 3.2 cc. of chloral, 3.7 cc. (= 3.0 Gm.) of the alcohol were added. The temperature of the reaction mixture rose 27.1° (27.2°, 27.2° and 26.9°) in twenty-five seconds (25, 27 and 24 seconds, respectively). After four months it was still liquid. It was soluble in heptane from which solvent crystals were obtained after three weeks that melted at 68°.

---

[1] *Ber.*, 3, p. 443. [2] *Ann.*, 157, p. 243. [3] *Ber.*, 7, p. 762.

Hexyl Alcohols.—None of the addition products of this group of isomeric alcohols appears to have been prepared. The alcohols used in the experiments here recorded were obtained from Eastman.

Primary Normal Hexyl Alcohol.—To 3.2 cc. of chloral, 4.2 cc. (= 3.45 Gm.) of the alcohol were added. The temperature of the reaction mixture rose 48.8° (48.0°, 49.2° and 49.4°) in ten seconds (10, 10 and 9 seconds, respectively). After standing three weeks it was still liquid with a dark brown color. It was soluble in heptane but did not crystallize from this solvent after standing for three weeks. From the combined three reaction mixtures, most of the hexyl alcohol was recovered by steam distillation. From the aqueous residue the chloral was recovered as chloral hydrate by means of ether. In the distillation flask there remained an appreciable dark, sticky residue. It is this impurity of the hexyl alcohol which, no doubt, accounts for the failure of the addition product of the alcohol in question with the chloral to crystallize.

Primary Alcohols.

1. HCH_2OH
   56.9°
2. CH_3CH_2OH
   61.2°
3. $CH_3CH_2CH_2OH$
   62.9°
4. $CH_3[CH_2]_2CH_2OH$ CH_3CHCH_2OH (CH_3)
   58.1° 57.2°
5. $CH_3[CH_2]_3CH_2OH$ $CH_3CHCH_2CH_2OH$ (CH_3) $CH_3CH_2CHCH_2OH$ (CH_3)
   50.6° 57°
6. $CH_3[CH_2]_4CH_2OH$ $CH_3CH(CH_2)_2CH_2OH$ (CH_3) $CH_3CH_2CHCH_2CH_2OH$ (CH_3)
   48.8°

Secondary Alcohols.

3. $(CH_3)_2CHOH$
   53.7°
4. $CH_3CH_2(CH_3)CHOH$
   52°
5. $CH_3CH_2CH_2(CH_3)CHOH$ $(CH_3CH_2)_2CHOH$ $CH_3CH(CH_3)CHOH$ (CH_3)
   53.4°
6. $CH_3CH_2CH_2CH_2(CH_3)CHOH$

Tertiary Alcohols.

4. $(CH_3)_2(CH_3CH_2)COH$
   14.7°
5. $(CH_3)_2(CH_3CH_2CH_2)COH$
   26.9°
6. $(CH_3)_2(CH_3CH_2CH_2CH_2)COH$
   23.4°

Secondary Iso Hexyl Alcohol (*Methyl n-Butyl Carbinol*).—To 3.2 cc. of chloral, 4.2 cc. (= 3.5 Gm.) of the alcohol were added. The temperature of the reaction mixture rose 45.6° (46.0°, 45.6° and 45.2°) in ten seconds (10, 10 and 10 seconds, respectively). After three weeks it had not solidified.

Tertiary Iso Hexyl Alcohol (*Dimethyl Normal Propyl Carbinol*).—To 3.2 cc. of chloral, 4.2 cc. of the alcohol were added. The temperature of the reaction mixture rose 23.4° (23.9°, 23.7° and 22.9°) in four minutes (4, 4½ and 4½ minutes, respectively). No crystallization had set in after three weeks' standing, however it had assumed a dark brown coloration. It was soluble in heptane. After standing three weeks in the cold crystals were obtained that melted at 47.°

In judging these preliminary results several allowances will have to be made.

1. Although three determinations were made in each case and the average of the three recorded in the following table, greater accuracy will, no doubt, become attainable with further experience.

2. In the case of the isomeric alcohols, the same volume was used although the slight differences in the density called for a corresponding change in volume to yield exact molecular equivalents. However, the inaccuracies in measuring such small volumes in the ordinary way may be assumed to be even greater than the differences caused by the failure to compute each volume separately.

3. While the purest materials attainable were used, absolute purity is out of the question. This is particularly true, *e. g.*, of ethyl alcohol which always contains traces of water which influences the reaction accordingly.

4. The difference in the length of time, from five seconds to as many minutes, required to reach the maximum temperature of reaction would seem to indicate either that greater accuracy should be attainable in this measurement, or that an impurity in the alcohol may be responsible.

In studying the results obtained, each property had better be considered separately. The heats of formation are naturally of prime interest. These have been recorded with the structural formulas arranged for each series of true homology for each subtype of alcohol.

Primary Alcohols.

Methyl		
1. HCH_2OH		
51.5°		
2. CH_3CH_2OH		
55–58°		
3. $CH_3CH_2CH_2OH$		
liq.		
4. $CH_3[CH_2]_2CH_2OH$	CH_3CHCH_2OH	
	CH_3	
58.5°	liq.	
5. $CH_3[CH_2]_3CH_2OH$	$CH_3CHCH_2CH_2OH$	$CH_3CH_2CHCH_2OH$
	CH_3	CH_3
liq.	55°	liq.
6. $CH_3[CH_2]_4CH_2OH$	$CH_3CH[CH_2]_2CH_2OH$	$CH_3CH_2CHCH_2CH_2OH$
	CH_3	CH_3
liq.	liq.	liq.

For the normal series of primary alcohols we have as many as six constants for comparison. However, any regularity that might be adduced from this series will not hold for the two series of iso primary alcohols. Moreover, the drop from 58.1° to 50.6° from butanol to pentanol seems too great. The determination of the heat

of formation of higher homologues may establish the incorrectness of this constant found. Again the drop from 57.2° to 57° for the two homologous iso alcohols seems too small. Hence, in all probability the two constants for both primary pentyl alcohols require correction. It is one of the great advantages of studying these constants in the light of structure that such incongruities are brought out and may be corrected by experiments made more carefully and with the purest materials attainable.

If the results drawn from the study of the influence of homology are still unsatisfactory, partly because the series do not as yet include a sufficient number of members, those that may be drawn from the study of comparable isomeric alcohols are even more so; again, in larger part, because the desired isomers were not available.

The work, however, offers sufficient encouragement to warrant its continuation.

The melting points of the addition products are tabulated in the tables.

Secondary Alcohols.

3. $(CH_3)_2CHOH$ 47°

4. $CH_3CH_2(CH_3)CHOH$ liq.

5. $CH_3CH_2CH_2(CH_3)CHOH$ liq.; $CH_3CH(CH_3)CHOH(CH_3)$ liq.; $(CH_3CH_2)_2CHOH$ liq.

6. $CH_3CH_2CH_2CH_2(CH_3)CHOH$ liq.

Tertiary Alcohols.

4. $(CH_3)_3COH$ 68°

5. $CH_3CH_2(CH_3)_2COH$ liq.

6. $CH_3CH_2CH_2(CH_3)_2COH$ liq.; $CH_3CH(CH_3)(CH_3)_2COH$

Inasmuch as ten out of the sixteen compounds prepared had not solidified after seven months, generalizations with regard to this constant are even less satisfactory if not impossible, either as to the effect of homology or of isomerism.

In conclusion, it may be desirable to emphasize once more the importance or, more truly, the absolute necessity of determining physical constants not as of individual compounds but as of members of series of true homology. The resolution of one of the compounds in the group of hexyl alcohol addition products into its components reveals how unreliable even the purest reagents attainable may be. To take the individual result in such a case and to record the constants obtained, results in the lumbering up of the literature. Of this we have had altogether too much.

STUDIES OF ASTRINGENCY.*

PART I.—A METHOD OF MEASURING ASTRINGENCY.

BY EDWIN R. THEIS.[1]

In various industrial processes, it is often necessary to measure at least relatively the astringent action of certain chemicals such as alum, zinc chloride, alcohol, tannic acid and certain mixtures of these substances. In reviewing the literature relative to this property, the writer was unable to find a method of rating astringency. The property is defined by Wilson[2] in terms of combination of tannin materials with animal skin. He says that when skin is placed in contact with tannin solution, the combination of tannin with the outer surface of the skin results in a tension or an area differing from that of the skin as a whole. While such a definition allows us to picture to some extent the nature of astringency, it does not give us a quantitative measurement of this property.

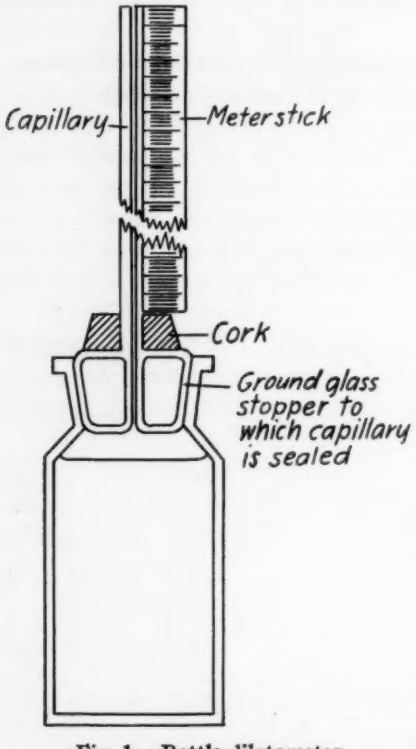


Fig. 1.—Bottle dilatometer.

If well-swollen tissue (skin) is placed in contact with such solutions as zinc chloride, alum, alcohol and water, then after an hour the skin surface examined microscopically, the surface of the pieces of skin immersed in zinc chloride or alum is seen to be drawn or tight while that immersed in water is unchanged. This experiment gives us a more quantitative picture of astringency but is entirely too cumbersome for ordinary laboratory measurement.

Theis and Neville[3] have shown that if tissue be brought in contact with water and placed in an improved "dilatometer," a contraction of the net volume takes place. This contraction is measured in the capillary tube attached. The apparatus used is shown in Fig. 1. The volume contraction is a direct measure of the hydration of the tissue. The theory involved is the following: When a tissue hydrates, the water taken up by the tissue during hydration is placed under compression within the tissue, the compressed water naturally occupying less space—resulting therefore in a decrease in net volume of the system.

---

* Scientific Section, A. PH. A., Rapid City meeting, 1929.

[1] Department of Chemistry and Chemical Engineering, Lehigh University, Bethlehem, Pa., and the Scientific Laboratories, Frederick Stearns & Co., Detroit, Michigan.

[2] J. A. Wilson, "The Chemistry of Leather Manufacture," *A. C. S. Monograph*, Chem. Catalog Co., 1928.

[3] *Ind. Eng. Chem.*, 21 (1929), 377.

This same theory should if true, work in the opposite manner—that is if we start with a fully hydrated tissue, placing it in the dilatometer together with a dehydrating solution, a net expansion of the system should occur, being measured in the capillary tube.

In microscopical studies of the action of so-called astringent solutions upon hydrated skin we find a "shrunken" effect-indicating dehydration. We can thus hypothecate that the action of astringents is to cause an instantaneous surface dehydration. If such is the case, then placing such solutions as those made from alum, zinc chloride, etc., in contact with hydrated skin, should cause a net increase of the system. This we find to be the case as is graphically shown in Figs. 2 and 3.

DISCUSSION.

Figures 2 and 3 show the dehydration of animal skin due to the astringent action of various substances. Figure 2 shows the relative astringency of a commercial mouth wash in comparison to such chemicals as alum and zinc chloride. It is also to be noted that for any given strength, zinc chloride exerts a greater dehydrating or "astringency" effect than does alum. The action of zinc chloride and alum may

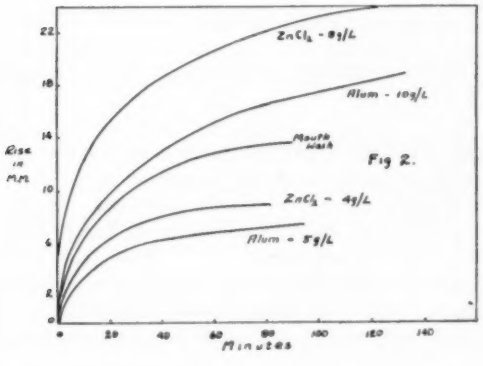


Fig 2.

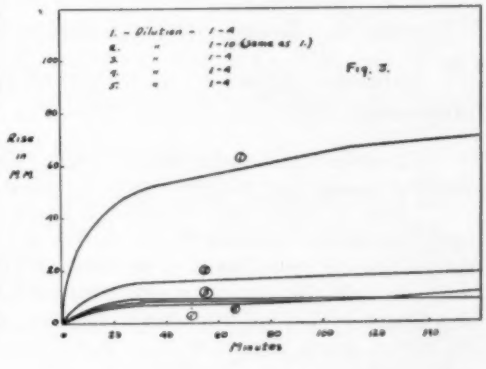


Fig. 3.

possibly be due to two distinct effects—hydrolysis of the reagent into hydrated oxide and free acid as shown in following equation:

$$ZnCl_2 + 2H_2O \rightleftharpoons ZnO.H_2O + 2HCl$$

Experimentally, the small amount of hydrochloric acid formed, was found to account for but a very small portion of the hydration while the formation of hydrated oxides appears to cause the greater portion of the dehydrating action.

Figure 3 shows the relative effect of various commercial astringent preparations and indicates that the various preparations differ widely as measured by this method. These preparations (as according to formula on label) all contained alcohol and zinc chloride.

CONCLUSION.

A distinctly new method for measuring the relative "astringency" of liquids has been devised. This method is based upon the principle that if well-hydrated tissue is treated with an astringent liquid, a net increase of the system occurs, which can be accurately measured. The astringent action of various chemicals and commercial preparations has been demonstrated and is shown graphically.

A STUDY OF THE STABILITY OF SOLUTION OF ARSENOUS AND MERCURIC IODIDE, U. S. P. X.[1,2,3]

BY WILLIAM J. HUSA[4] AND W. W. F. ENZ.

INTRODUCTION.

Following the introduction of arsenous iodide into medicine in 1826 (1), and in view of the use of combinations of arsenic, iodine and mercury in the treatment of certain diseases, Dr. M. Donovan of Dublin in 1839 prepared a solution containing compounds of these three elements. Solution of Arsenous and Mercuric Iodide, commonly called Donovan's Solution, is official in the U. S. P. and in the British Pharmacopœia; other pharmacopœias have not adopted it (2).

The U. S. P. X offers the following suggestion to retard the deterioration of Donovan's Solution: "Preserve in well-filled, amber-colored bottles." However, it is well known that in spite of these precautions the solution is notably poor in keeping qualities. In the present investigation a study was made of the various factors which might influence the deterioration of Donovan's Solution, and of possible means of retarding the deterioration.

CHEMICAL COMPOSITION OF DONOVAN'S SOLUTION.

Various explanations have been given of the reactions which take place in the preparation of Donovan's Solution.

Donovan (1) thought that a chemical action takes place with the formation of a double iodide of arsenic and mercury, which he called a "hydriodate of arsenic and mercury."

Dott (3) stated that when AsI_3 is dissolved in water, a very basic salt is produced. Similarly, Dupouy (4) reported that a solution of arsenous iodide does not contain AsI_3, but rather the products of hydrolysis, *i. e.*, arsenous anhydride and hydriodic acid.

In 1903, Duncan (5) reported that Donovan's Solution does not contain AsI_3 and HgI_2 or a double iodide, but is a solution of As_2O_3, with a little undecomposed AsI_3, HgI_2 and HI. He further stated that most of the acid is combined with HgI_2, forming soluble mercuro-iodic acid, H_2HgI_4.

Langenhan (6), in 1925, expressed the opinion that Donovan's Solution is "essentially an aqueous solution of arsenous acid and a compound of mercury di-iodide with hydrogen iodide, and that other substances, such as a double halide, arsenic tri-iodide, arsenic hydroxyiodide, etc., are present in minor phases, if at all in recognizable quantities."

In view of our present knowledge of the chemical properties of the substances involved, it appears quite certain that the original explanation as given by Donovan is incorrect. It is well known (7) (8) that the arsenic halides are considerably hydrolyzed in aqueous solution. In a one per cent solution of AsI_3, corresponding to Donovan's Solution, the hydrolysis is almost complete:

$$AsI_3 + 3H_2O \rightleftharpoons As(OH)_3 + 3HI$$

---

[1] This investigation was aided by a grant from the AMERICAN PHARMACEUTICAL ASSOCIATION Research Fund.

[2] This paper is based on a thesis presented to the faculty of the Graduate School of the University of Florida by W. W. F. Enz, in partial fulfillment of the requirements for the degree of Master of Science in Pharmacy.

[3] Scientific Section, A. PH. A., Rapid City meeting, 1929.

[4] Professor of Pharmacy, University of Florida.

Ten grams AsI_3 as represented in a liter of Donovan's Solution would form 8.42 Gm. HI on hydrolysis if hydrolyzed completely.

HgI_2 is practically insoluble in water, according to Bourgoin (9) 0.005 Gm. being soluble in 100 cc. of water at 22° C. It is well known, however, that HgI_2 is soluble in solutions of iodides with the formation of a complex anion (10):

$$\underset{\text{red, insoluble}}{HgI_2} + 2HI \rightleftharpoons H_2HgI_4$$

or, represented ionically:

$$HgI_2 + 2\bar{I} \rightleftharpoons (\bar{HgI_4})$$

Ten grams HgI_2 would require 5.63 Gm. HI to form the above soluble compound. This would leave 2.79 Gm. of free HI, assuming complete hydrolysis.

From these well-known reactions, it appears that the HgI_2 in Donovan's Solution goes into solution by reacting with the HI and that the finished product is essentially a solution containing arsenous acid, hydrogen mercuric iodide and hydriodic acid.

The name "Solution of Arsenous and Mercuric Iodide" tends to give the impression that the solution contains AsI_3 and HgI_2 or a double compound of the two. For this reason, the real nature of the solution has not been generally understood. Considering the actual composition, it would be more specific to designate it as "Solution of Arsenous Acid, Hydriodic Acid and Hydrogen Mercuric Iodide."

DETERIORATION OF DONOVAN'S SOLUTION.

Donovan realized (1) that constancy of composition and strength were important, for he states that "the compound must be permanent, not liable to spontaneous decomposition, nor to injuries arising from careless exposure to light or air." He thought his preparation fulfilled these requirements.

However, in course of time, the trivalent arsenic in Donovan's Solution is oxidized to pentavalent arsenic (2) (11) (12) (13). Light increases the rate of oxidation (14). Schulze (14) found that a commercial sample of Donovan's Solution was low in trivalent arsenic, although an assay for total arsenic showed no deficiency. In the present investigation, it was found that a sample of Donovan's Solution purchased from a wholesale drug house in the regular course of business was deficient in trivalent arsenic to the extent of 33.1 per cent.

It is an established fact that HI in aqueous solution in presence of air, liberates free iodine according to the following equation:

$$2HI + O \rightleftharpoons H_2O + I_2$$

In an aqueous solution containing only hydriodic acid, free iodine accumulates. The HI in Donovan's Solution is subject to this same oxidation; however, free iodine does not appear in the solution until all or most of the arsenous acid has been oxidized to arsenic acid according to the following equation:

$$As(OH)_3 + I_2 + H_2O \rightleftharpoons As(=O)(OH)_3 + 2HI$$

As shown by the equation, the free iodine is thus reduced to HI, which is again subject to oxidation by atmospheric oxygen as before. This cycle continues until all or most of the arsenic is in the pentavalent form. Before equilibrium is reached in the oxidation of the trivalent arsenic, no free iodine is present as shown by testing with starch T. S.

After all or most of the trivalent arsenic is oxidized to pentavalent arsenic, the free iodine accumulates, being no longer reduced to HI. As the amount of HI present becomes reduced, more HI is set free by causing the following equation to proceed toward the left:

$$HgI_2 + 2HI \rightleftharpoons H_2HgI_4$$

Eventually there is not sufficient HI to keep all of the HgI_2 in solution and as a result a red precipitate of HgI_2 appears in the solution. This was observed by Goodman (15) on a 5-year-old sample, which contained all its arsenic in the pentavalent form, also containing free iodine and precipitated HgI_2.

With reference to Donovan's Solution, the U. S. P. X states that "it must not be dispensed if darker than pale yellow." In this connection it should be noted, however, that almost all of the As^{III} may be oxidized to As^{V} before there is any change in the color of the solution.

EXPERIMENTAL DATA.

Experimental Methods.—In the present study of Donovan's Solution, the assay of AsI_3 was used as an index of the stability of the solution. The U. S. P. method of assay was used, which is as follows:

> Assay for arsenous iodide—Measure accurately 25 cc. of Solution of Arsenous and Mercuric Iodide into a flask, dilute with 25 cc. of distilled water, then dissolve 2 Gm. of sodium bicarbonate in this solution, and titrate with tenth-normal iodine, using starch T. S. as indicator.

The usual method of procedure for comparing the stability of the various solutions was to expose 50-cc. samples, contained in ordinary 2-oz. prescription bottles, in diffused light and sunlight. The deterioration under these conditions was more rapid than in well-filled, amber-colored bottles and it was thus possible to secure quicker results. The entire sample was used for analysis. When more than one sample of the same kind was analyzed, the average result was taken and recorded in the tables.

Effect of Different Utensils Used.—Tests were made to determine whether the different utensils that a pharmacist might use in preparing or storing Donovan's Solution had any effect on the stability of the solution. Solutions were prepared in glass, porcelain and wedgewood mortars and the deterioration of the solutions noted by analyses made at successive intervals. It was concluded that the type of mortar used had no material effect upon the stability of the solution. It was also found that the rate of deterioration in corked prescription bottles was the same as in glass-stoppered Pyrex bottles.

Effect of Differences in Chemicals Used.—As samples of arsenous iodide made by different manufacturers differ somewhat in purity and physical properties, tests were made of the stability of Donovan's Solution prepared from three different commercial samples of AsI_3. These samples varied in color from orange

to dark red, in luster from no luster to marked luster; one of the samples gave a test for free iodine. The solutions prepared from these different materials showed approximately equal rates of deterioration.

Effect of Having Elements in Atomic Proportions.—In 1847, William Procter, Jr., (16) suggested the use of the elements in atomic proportions in the preparation of Donovan's Solution. An experiment was performed, which showed that the rates of deterioration of samples of Donovan's Solution made by the official process and using the chemicals in atomic proportions were practically uniform. The proportions used in the two solutions were as follows:

	U. S. P. method.	Atomic proportions.
AsI_3 per liter	10.000 Gm.	10.028 Gm.
HgI_2 per liter	10.000 Gm.	10.000 Gm.

Effect of Different Concentrations and Proportions.—The composition of Donovan's Solution since its origin has remained fairly constant. In order to determine what effect different concentrations and proportions would have on the stability, the following experiment was performed. Five solutions were made. The first was made according to the U. S. P.; this was used as the control. The second was made four times the U. S. P. strength while the third was made one-fourth the U. S. P. strength. The fourth contained 1 per cent of AsI_3 but only 0.67 per cent of HgI_2, the AsI_3 therefore being in excess. The fifth contained 1 per cent of AsI_3 and 1.5 per cent of HgI_2; a slight amount of HgI_2 remained undissolved and was filtered out.

TABLE I.—EFFECT OF DIFFERENT CONCENTRATIONS AND PROPORTIONS.

	Percentage Deterioration in Sunlight. After 15 days.	After 22 days.
Control	30.3	36.9
Concentrated solution	9.2	8.9
Dilute solution	100.0	100.0
Excess AsI_3 solution	31.7	33.6
Excess HgI_2 solution	35.9	37.4

In sunlight, a solution more dilute than the official solution deteriorated more rapidly; one more concentrated deteriorated less rapidly. Changes in the proportions of the ingredients had practically no effect on the stability.

Effect of Filtration.—All pharmacopœias in which Donovan's Solution appeared have directed it to be filtered. The U. S. P. of 1850 also required that the solution be heated to boiling before filtering; it was later shown that boiling drives off some of the arsenic (6). The following experiment was carried out to determine the effect of non-filtration, and also to test a method of preparing the solution by agitation in a bottle.

TABLE II.—DETERMINATION OF THE EFFECT OF NON-FILTRATION AND OF PREPARING THE SOLUTION BY AGITATION IN A BOTTLE.

Method of preparation.	Percentage Deterioration in Diffused Light. 50 days.	85 days.	247 days.
Mortar and pestle (U. S. P. method)	15.4	26.6	43.9
Mortar and pestle (non-filtered)	5.2	9.5	26.6
Agitation in bottle (filtered)	10.3	12.3	46.7
Agitation in bottle (non-filtered)	8.1	10.3	23.5

It would appear that solutions which are not filtered deteriorate less rapidly than those which are filtered. The residue in the non-filtered solutions contains free arsenic (17); the effect of this on the keeping qualities of the solution will be discussed later. The solution prepared by shaking in a bottle is at least as stable as that made by the official method in a mortar.

Experiments were carried out in which decolorizing charcoal, wood charcoal, pipe clay, kaolin and pumice were added to Donovan's Solution just before filtering. None of these had a stabilizing effect upon the solution.

Effect of a Globule of Mercury.—According to Brown (18) the addition of a globule of mercury to Donovan's Solution exerts a stabilizing influence on the solution. Tests were made on this point.

TABLE III.—EFFECT OF A GLOBULE OF MERCURY.

	Percentage Deterioration in Diffused Light.			
	28 days.	57 days.	97 days.	177 days.
Control	3.4	6.3	9.1	15.1
Control plus Hg	4.4	6.3	13.2	26.3

The addition of a globule of mercury to the solution has no effect during the first few months. After that time, the solution containing the globule of mercury apparently deteriorates more rapidly than the control.

Effect of Free Arsenic.—It is stated in a textbook (19) that the addition of fine arsenic to Donovan's Solution largely obviates the deterioration. Tests were therefore made on this point. It was found that some of the free arsenic went into solution in the course of time, making the arsenic content several times as great as the U. S. P. strength. Obviously this method of preservation is impractical.

Effect of Completeness of Filling of Bottle.—The U. S. P. directs that Donovan's Solution should be kept in well-filled bottles. Tests were made on two bottles completely filled and two bottles half-filled. There was less deterioration in the completely filled bottles, the deterioration after 71 days in diffused light being 3.1 per cent as compared with 6.0 per cent deterioration in the half-filled bottles.

Effect of Paraffin, Etc.—It was thought that occasion might arise to seal some of the cork-stoppered bottles with paraffin. Tests for possible effects of paraffin were therefore made by the addition of pieces of paraffin to the solution, and by placing a coat of paraffin inside the bottle; in each case there was no change in the stability of the solution. It was also found that tobacco smoke had no effect on the rate of deterioration. A layer of chloroform in the bottom of the bottle had no effect on the keeping qualities of the solution in diffused light; however, it was observed that a pink tinge, apparently due to free iodine, appeared in the chloroform layer, varying in intensity from day to day, at times disappearing completely.

Effects of Other Solvents.—A series of experiments was carried out to determine the effect of replacing 25 per cent of the water in Donovan's Solution by other solvents.

Honey has a marked stabilizing influence when present in this proportion. The solution containing honey was not filtered and on standing an insoluble residue settled to the bottom. Syrup, glucose and glycerin stabilize the solution to a certain extent, while alcohol hastens the deterioration.

TABLE IV.—EFFECT OF REPLACING 25 PER CENT OF THE WATER BY OTHER SOLVENTS.

	Percentage Deterioration. Diffused Light. 23 days.	52 days.	92 days.	149 days.	Sunlight. 9 days.
Control	5.9	12.4	20.9	36.3	27.6
Alcohol	7.6	15.2	26.5	46.5	41.6
Glycerin	7.3	13.4	18.1	23.4	18.6
Honey	3.6	6.3	7.7	7.1	0.8
Syrup	5.9	20.9	14.3	13.2	0.9
Glucose solution (12.5%)	8.6	15.7	20.0	23.9	16.8

Effect of Storage in Refrigerator.—The following experiment was performed to see if storage in a refrigerator would reduce the rate of deterioration.

TABLE V.—EFFECT OF STORAGE IN AN AUTOMATIC ELECTRIC REFRIGERATOR.

	Percentage Deterioration. 127 days.	155 days.	178 days.
Room temperature (in the dark)	9.2		13.0
Refrigerator (in the dark)	2.8	3.0	

The results in Table V indicate that storage in a refrigerator reduces the rate of deterioration of Donovan's Solution.

Effect of a Layer of Liquid Petrolatum.—Since a layer of liquid petrolatum is used to protect liquid preparations of ferrous carbonate from the air above the solution, a test was made to see whether this method was applicable to Donovan's Solution.

TABLE VI.—EFFECT OF A LAYER OF LIQUID PETROLATUM.

	Percentage Deterioration in Diffused Light. 28 days.	57 days.	97 days.	177 days.
Control	3.4	6.3	9.1	15.1
Control plus petrolatum	2.8	4.9	7.0	13.7

The results indicate a very slight preservative effect but this is too small to be of practical value.

Effect of Displacement of the Air in the Bottle by an Inert Gas.—It was thought that displacement of the air in the bottle containing Donovan's Solution with an inert gas might result in a more stable preparation. A series of bottles of Donovan's Solution was therefore saturated with hydrogen and securely stoppered. Another series used as a control was not saturated with hydrogen. By immediately analyzing some of the bottles containing hydrogen it was found that this treatment had caused no change in the trivalent arsenic content.

TABLE VII.—EFFECT OF DISPLACEMENT OF THE AIR IN THE BOTTLE BY HYDROGEN.

	Percentage Deterioration in Sunlight. 13 days.	28 days.	56 days.
Atmosphere above solution:			
Air	30.8	53.6	29.3
Hydrogen	6.8	7.2	7.2
	Diffused Light. 28 days.	56 days.	Dark. 79 days.
Air	5.4	11.7	17.3
Hydrogen	4.6	9.6	6.1

The results indicate that displacement of the air in the bottle by hydrogen has a marked preservative influence on the solution.

In the course of the work it was noted that bottles of Donovan's Solution taken from the same batch and kept side by side under identical conditions would not always deteriorate uniformly, the percentage differences in deterioration being greater than the experimental errors expected. For example, four bottles analyzed at the end of 56 days showed the following deterioration:

TABLE VIII.—PERCENTAGE DETERIORATION.

Diffused light.	Sunlight.
11.96 (variation of 6.1%)	30.98 (variation of 11.2%)
11.25	27.71

As a corked bottle limits the amount of oxygen available for oxidation of the trivalent arsenic, a calculation was made to determine how much oxygen would be necessary to completely oxidize the trivalent arsenic in Donovan's Solution. For the complete oxidation of the trivalent arsenic in 50 cc. of the solution, 12.3 cc. of oxygen or 61.5 cc. of air are required.

However, the amount of oxygen available in a securely corked 2-oz. bottle containing 50 cc. of Donovan's Solution is very much less than this. There is approximately 13 cc. of air above the solution below the cork. This is equivalent to 2.6 cc. of oxygen. In addition to this, there would also be a slight amount of oxygen dissolved in the water; assuming the solubility in Donovan's Solution as being the same as in water, the amount of dissolved oxygen in 50 cc. of Donovan's Solution would be 0.40 cc. Assuming all the available oxygen in the bottle to be consumed, this would oxidize only 24.4 per cent of the trivalent arsenic.

Due to the absorption of the oxygen used to oxidize the HI, a partial vacuum would be formed. While precautions were taken to see that the bottles were securely corked, there is a possibility that there was a certain amount of leakage through or around some of the corks; this would introduce a variable factor which may be the cause of the variation in the results as different corks might allow this vacuum to draw in different amounts of additional air.

To eliminate the possibility of infiltration of air, an experiment was carried out in which Donovan's Solution was sealed up in 5-cc. ampuls and exposed on the roof to sunlight for 5 days. The solution was then analyzed and was found to have deteriorated 24.0 per cent. By calculation, the amount of air in the sealed ampul could account for only 16.6 per cent deterioration; it is evident, therefore, that some other factor besides oxidation of HI enters into the deterioration of Donovan's Solution.

Warburg and Rump (20) observed that in an atmosphere of CO_2, HI solutions decomposed by the absorption of light energy into hydrogen and iodine. It appears from this that in Donovan's Solution light alone, by liberating iodine, may cause oxidation of the trivalent arsenic.

In view of this decomposition observed by Warburg and Rump (20) it is likely that part of the deterioration of Donovan's Solution takes place as follows:

$$2HI \rightleftharpoons H_2 + I_2$$

$$As(OH)_3 + I_2 + H_2O \rightleftharpoons H_3AsO_4 + 2HI$$

Oxidation of trivalent arsenic may thus take place without atmospheric oxygen; this would explain why greater deterioration was observed than could be

accounted for by the amount of air in the bottle. The failure of an inert gas to completely preserve Donovan's Solution may also be explained by these reactions.

Effect of Neutralization.—Duncan (5) suggested that the deterioration of Donovan's Solution may be checked by neutralizing the HI with alkali. Guyot (21) offered this same suggestion for checking the deterioration of a solution of arsenous iodide. Accordingly, an experiment was carried out on Donovan's Solution containing various amounts of acid and base. In order to have the Donovan's Solution of U. S. P. strength after the acid or base was added, the solution, was first prepared in a slightly more concentrated form, so that 40 cc. contained AsI_3 and HgI_2 equivalent to 50 cc. of U. S. P. solution. The control was diluted with 10 cc. of distilled water. In the others, varying amounts of acid or base were added, and then sufficient distilled water to bring the final volume to 50 cc.

TABLE IX.—EFFECT UPON THE STABILITY OF DONOVAN'S SOLUTION OF ADDING VARYING AMOUNTS OF ACID AND BASE.

Amount of acid or base added.*	Percentage deterioration after 133 days.	Amount of acid or base added.*	Percentage deterioration after 133 days.
10 cc. acid	62.7	1 cc. base	40.5
8 cc. acid	50.6	2 cc. base	49.1
6 cc. acid	57.3	4 cc. base	34.0
4 cc. acid	43.0	6 cc. base	22.3
2 cc. acid	52.9	6.2 cc. base (neutral to methyl orange)	19.2
1 cc. acid	47.2	8 cc. base	26.6
Control	49.5	10 cc. base	55.4

* Approximately *N*-1 HCl and KOH.

The results indicate that Donovan's Solution is more stable near the neutral point, the rate of deterioration increasing with increasing acidity or basicity.

Apparently no previous work has been done on the determination of the p_H value of Donovan's Solution. By the use of indicators, it was found that the p_H of freshly prepared Donovan's Solution is approximately 1.2.

Preparation of Donovan's Solution by a New Method.—In the preparation of Donovan's Solution, Donovan originally used the free elements; later Souberin modified this method by using the iodides of the metals. Since then, apparently, no thought has been given to the preparation of this solution by any other method. Considering the real nature of the solution as being essentially a solution of arsenous acid, hydriodic acid and hydrogen mercuric iodide, there seems to be no necessity of starting with AsI_3, particularly in view of the fact that AsI_3 probably varies somewhat and is itself quite unstable unless properly preserved. The same result could be obtained by starting with As_2O_3, putting it in solution with HCl and then neutralizing the acid; the HgI_2 could be put in solution in the presence of an excess of KI, the KI being present in an amount sufficient to make the total iodide content equivalent to that present in the official formula.

In accordance with this idea, a modified solution was prepared. The directions for preparation are as follows:

"As_2O_3	2.1717 Gm.
HgI_2	10.0000 Gm.
KI	10.9286 Gm.

Diluted HCl, U. S. P.	10.86	cc.
Normal KOH solution	q.s.	
Distilled water, q.s.	1000	cc.

With the aid of heat dissolve the As_2O_3 in a mixture of the diluted HCl and 55 cc. of water. Dilute the solution to 150 cc. and neutralize with *N*-1 KOH solution, the amount of KOH solution needed being determined by titration of an extra portion of the solution, using methyl orange as indicator. Dilute to 500 cc. Prepare another solution containing the HgI_2 and KI in water sufficient to make 500 cc. Mix the two solutions."

The quantitative composition of the official Donovan's Solution, which is acid in reaction, is probably per liter:

As_2O_3	2.17 Gm. (Equivalent to 10 Gm. AsI_3)
H_2HgI_4	15.63 Gm. (Equivalent to 10 Gm. HgI_2)
HI	2.79 Gm.

The quantitative composition of the modified neutral solution, is probably per liter:

As_2O_3	2.17 Gm. (Equivalent to 10 Gm. AsI_3)
K_2HgI_4	17.30 Gm. (Equivalent to 10 Gm. HgI_2)
KI	3.63 Gm.
KCl	2.32 Gm. (Calculated as KCl from the amount of HCl used in the preparation)

The quantitative amounts of the elements arsenic, mercury and iodine in the two solutions are identical, the modified solution containing K and Cl ions in the amounts indicated instead of H ions as in the official preparation.

Comparisons between the rates of deterioration of the modified Donovan's Solution and the official solution are given in Table X. Samples of the modified solution which were made slightly more basic and slightly more acidic were also placed under observation; these were made by adding 0.3 cc. of *N*-1 KOH and *N*-1 HCl, respectively, to 50 cc. of the modified Donovan's Solution. The approximate p_H of the solutions, as determined with the La Motte Roulette Comparator, is also given in the table; these determinations were made after the solutions had been standing in diffused light for several months.

TABLE X.—STABILITY OF MODIFIED DONOVAN'S SOLUTION.

	Percentage Deterioration in Diffused Light.		
No. of days' exposure.	Control.	Modified solution p_H 5.5.	Modified solution p_H 6.5.	Modified solution p_H 4.0.
9 days		0.4	0.3	0.3
38 days	3.8	0.8	2.0	1.9
59 days	5.0	0.7	2.2	2.5
78 days	7.3	0.7	2.7	3.9
93 days	9.1	0.3	3.1	4.0
135 days	14.5	1.1	3.7	7.1
158 days		0.9	4.7	9.4
		IN SUNLIGHT.		
9 days	21.9	24.7	18.9	23.0
38 days	78.2	90.5	83.3	84.3
		IN THE DARK.		
107 days	8.2	0.5	0.5	3.9
158 days		0.3	0.7	6.5

		IN REFRIGERATOR.		
107 days	2.7	0.4	0.5	1.3
135 days	3.0	0.1	0.0	1.4

When kept in the direct sunlight, the modified solution showed no advantage, but under the usual conditions of storage in diffused light the modified solution was remarkably stable. In the dark, both at room temperature and in the refrigerator, the modified solution of p_H 5.5 and the modified solution of p_H 6.5 were both very stable, showing less deterioration than the modified solution of p_H 4.0 and the official Donovan's Solution.

Study of Stabilizers.—As it seemed possible that a negative catalyst of oxidation might be discovered which would stabilize the solution, experiments along this line were carried out.

Before a substance could be tested for its possible stabilizing effect, it was necessary to determine whether it would interfere with the subsequent assay of the Donovan's Solution. To do this, 0.2 Gm. of the substance was placed in 50 cc. of Donovan's Solution. This was then titrated with standard iodine solution. Any variation from a blank of Donovan's Solution alone showed interference, due usually to covering up of the end-point or reaction of the substance with the iodine solution.

In carrying out the tests, 50-cc. portions of Donovan's Solution were placed in 2-oz. prescription bottles by means of a calibrated pipette, and 0.2 Gm. of the substance to be tested was added. In each case one bottle was placed in the sunlight, one in diffused light and one in the dark, for a period of from 113 to 125 days.

Some of the substances tried as stabilizers were acid or basic in character. As this property in itself might affect the stability of Donovan's Solution, these substances, before being added to the solution, were neutralized with the appropriate amount of KOH or HCl, as previously determined by titration, using methyl orange as indicator. Experiments were also run in which these substances were tested without being neutralized.

The following substances had no effect on the rate of deterioration of Donovan's Solution:

Acacia, acetanilid, phosphoric acid, picric acid, stearic acid, tartaric acid, alcohol, benzaldehyde, caffeine, camphor, chloral hydrate, dextrin, dextrose, diphenyloxide, ethyl bromide, ethylene glycol, glycerin, honey, menthol, methylamine hydrochloride, methyl iodide, naphthalene, nickel sulphate, nitrobenzene, phenolphthalein, piperine, potassium chloride, salicin, saponin, sodium acetate, sodium chloride, sodium citrate, sodium hypophosphite, sodium salicylate, sodium silicate, sodium thiosulphate, sucrose, sulphur, thymol, tragacanth; (the following substances both with and without neutralization), anthranilic acid, boric acid, citric acid, lactic acid, aniline hydrochloride, phenol, potassium bitartrate, saccharin, sodium borate and vanillin.

The following substances hastened the deterioration under at least one condition of exposure and failed to show any stabilizing effect under any of the conditions:

Barium carbonate, benzene, chrysarobin, copper tartrate, ethylene chlorhydrin, ethyl iodide, gelatin, iodoform, potassium iodide, uranium acetate and urea.

The following substances had a stabilizing effect under at least one condition of exposure:

Ammonium carbonate, anethol, tincture of benzoin, calcium carbonate, copaiba, ethyl methyl ketone, eucalyptol, fuchsin, methenamine, oil of caraway, oil of cinnamon, oil of rosemary, terebene, terpin hydrate; the following substances both with and without neutralization: Hypophosphorous acid, oxalic acid, diethyl amine, nicotine; (the following neutralized substances) tartaric acid and benzaldehyde.

After further tests, it appeared that the following substances retarded the deterioration of Donovan's Solution:

Methenamine, hypophosphorous acid, oxalic acid, terpin hydrate and calcium carbonate.

Since methenamine is incompatible with Donovan's Solution because of the production of a heavy yellow precipitate, it is not suitable for use as a stabilizer for the solution.

As hypophosphorus acid is used as a stabilizer in official preparations of hydriodic acid, it was hoped that it would be effective in the stabilization of Donovan's Solution, since this depends on the stability of HI formed by hydrolysis of AsI_3; however, hypophosphorous acid cannot be used for this purpose on account of the fact that it gives a black precipitate, which is probably free arsenic, with Donovan's Solution.

Oxalic acid chemically seems to be quite suitable as a stabilizer; however, it is objectionable because of its poisonous character. The least objectionable stabilizers appear to be terpin hydrate and calcium carbonate. Calcium carbonate has a two-fold stabilizing effect: it neutralizes the acidity, and the CO_2 evolved displaces some of the air. Using a slight excess of $CaCO_3$, there was 0.1% deterioration after 56 days in diffused light, as compared with 11.7% deterioration in the control. However, if the solution had been filtered, much of the CO_2 would probably have been lost.

The Effect of Different Wave-Lengths of Light.—If light is passed through a colored solution, the solution will transmit chiefly light of the wave-length corresponding to its color and will absorb the major portion of the remainder of the spectrum of the incident light. Using colored solutions as light filters, some tests were carried out, the 2-oz. sealed bottles of Donovan's Solution being placed in 600-cc. beakers, the beakers then being filled with the colored solutions. The beakers were covered by larger beakers and exposed to direct sunlight on the roof.

TABLE XI.—EXPERIMENT USING COLORED SOLUTIONS AS LIGHT FILTERS.

Solution surrounding bottle.	Percentage Deterioration in Sunlight. 7 days.	28 days.
Control	32.2	59.0
Water	32.0	56.6
Cresol	1.3	5.3
Cochineal	2.0	7.6
Methyl red in acid solution	27.6	41.4
Saturated potassium dichromate solution	0.8	15.4
Saturated picric acid solution	1.2	5.0
Phenolphthalein in alkaline solution	27.3	55.1
Saturated copper sulphate solution	27.2	47.1

Table XI indicates that Donovan's Solution deteriorates less rapidly in light passed through a saturated solution of picric acid or potassium dichromate, these solutions probably acting as partial light filters of the rays which are most effec-

tive in oxidizing Donovan's Solution. The protective influence of cresol and cochineal solution is probably due to their dark color, which cuts out most of the light of all wave-lengths.

Tests of Donovan's Solution in the dark, in diffused light and in sunlight in Pyrex glass-stoppered bottles, ordinary prescription bottles, and glass-stoppered Erlenmeyer flasks indicated that the type of colorless glass container used has no appreciable influence upon the stability of the solution. Tests were also made with bottles of colored glass. It was impossible to secure bottles of different colored glass of the same size and shape; however, experiments were carried out in such bottles of colored glass as were available. The brown bottles had a marked protective influence, but rapid deterioration took place in bottles of blue, green and colorless glass.

In order to secure more definite information as to what part of the spectrum is chiefly responsible for the deterioration, tests were made using light filters obtained from the Corning Glass Works. These light filters were in the form of plates of special glass about six inches square. Light-proof and water-proof wooden cabinets were constructed, in which the special glass plates served as windows. The cabinets were placed on the roof in direct sunlight, the Donovan's Solution in prescription bottles being placed within the cabinet. Eleven different light filters were used. The trade names of the light filters which appreciably retarded the deterioration of Donovan's Solution are as follows: "Noviol C," "HR Yellow-Yellow," "HR Yellow-Red," "Red" and "Heat Transmitting." From a study of the results obtained and the data on the light transmitted by the various filters, it was concluded that the wave-length of the light which causes most of the deterioration of Donovan's Solution stored in ordinary glass prescription bottles lies between 3200 and 4600 Å. This range includes the blue end of the visible spectrum.

SUMMARY.

1. A study has been made of the various factors which might influence the deterioration of Solution of Arsenous and Mercuric Iodide, U. S. P. X, commonly known as Donovan's Solution, and of possible means of minimizing this deterioration.

2. The name "Solution of Arsenous and Mercuric Iodide" tends to give the impression that the solution contains AsI_3 and HgI_2, or a double compound of the two. However, this preparation is essentially a solution of arsenous acid, hydrogen mercuric iodide and hydrogen iodide.

3. The deterioration of Donovan's Solution results in the oxidation of As^3 to As^5, which takes place as follows:

$$2HI + O \rightleftharpoons H_2O + I_2$$

$$As(OH)_3 + I_2 + H_2O \rightleftharpoons H_3AsO_4 + 2HI$$

In the present investigation, it was found, however, that frequently more deterioration took place than could be accounted for by the amount of air in the bottle. In view of this, and on the basis of the observation by Warburg and Rump that solutions of HI exposed to light undergo decomposition into H_2 and I_2, it appears that a part of the deterioration takes place as follows:

$$2HI \rightleftharpoons H_2 + I_2$$
$$As(OH)_3 + I_2 + H_2O \rightleftharpoons H_3AsO_4 + 2HI$$

4. The following factors had no effect on the stability of Donovan's Solution: (*a*) use of porcelain, glass or Wedgewood mortar; (*b*) changes in the proportions of the ingredients; (*c*) use of chemicals made by different manufacturers; (*d*) preparation of the solution by shaking the ingredients in a bottle.

5. The following factors were found to increase the stability of Donovan's Solution: (*a*) storage in amber bottles; (*b*) storage in well-filled bottles; (*c*) storage in a refrigerator; (*d*) replacement of the air in the bottle by an inert gas; (*e*) replacement of 25 per cent of the water by honey or syrup.

6. It has been reported that a globule of mercury placed in Donovan's Solution exerts a stabilizing influence. Tests on this point in the present study have shown that a globule of mercury does not increase the stability of the solution.

7. According to a statement in a textbook, the addition of fine arsenic to Donovan's Solution largely obviates the deterioration. This method was found to be impractical, as some of the free arsenic goes into solution in course of time, making the arsenic content several times as great as the U. S. P. strength.

8. The p_H of freshly prepared Donovan's Solution is approximately 1.2. Experiments on the effect of adding varying quantities of acid and base indicate that the solution is more stable near the neutral point, the rate of deterioration increasing with increasing acidity or basicity.

9. The addition of an amount of calcium carbonate sufficient to neutralize the acid in Donovan's Solution has a marked preservative influence, which appears to be due to a combination of two factors: (*a*) a more favorable p_H; (*b*) replacement of air by the inert gas, CO_2.

10. A neutral solution corresponding identically with the official U. S. P. solution as to As, Hg and I content, but varying in chemicals used, method of preparation, and p_H value, was found to be much more stable than the official solution.

11. The addition of 0.4 per cent of oxalic acid, methenamine, terpin hydrate or hypophosphorous acid retards the deterioration of Donovan's Solution. Oxalic acid is objectionable because of its poisonous character; methenamine and hypophosphorous acid are incompatible with Donovan's Solution, due to the formation of precipitates; terpin hydrate seems least objectionable.

12. From experiments with light filters, it was concluded that light of the wave-length lying between 3200 and 4600 Å. causes most of the deterioration of Donovan's Solution.

REFERENCES.

1. M. Donovan, *Dublin Journ. of Med. Sci.*, 16 (1839), 277; reprinted in JOUR. A. PH. A., 14 (1925), 585.

2. H. A. Langenhan, *Ibid.*, 14 (1925), 507–511.

3. D. B. Dott, *Pharm. Jour. Trans.* (Jan. 28, 1893), 619; through PROC. A. PH. A., 41 (1893), 758.

4. D. Dupouy, *Chem. News* (Sept. 14, 1900), 130; from *Bull. soc. pharm. Bordeaux*, 1900; through PROC. A. PH. A., 49 (1901), 799.

5. Wm. Duncan, *Pharm. Jour.* (Apr. 25, 1903), 586; through PROC. A. PH. A., 51 (1903), 631.

6. H. A. Langenhan, JOUR. A. PH. A., 14 (1925), 579–587.

7. L. B. Richardson, "General Chemistry" (1927), 730.
8. J. Kendall, "Smith's College Chemistry" (1923), 665.
9. Bourgoin, quoted by J. W. Mellor, "A Comprehensive Treatise on Inorganic and Theoretical Chemistry," IV (1923), 911.
10. F. P. Treadwell and W. T. Hall, "Analytical Chemistry," 5th Edition, I (1920), 210.
11. A. R. L. Dohme, JOUR. A. PH. A., 9 (1920), 312.
12. Joseph Rosin, *Ibid.*, 6 (1917), 951.
13. W. H. Schulze, *Ibid.*, 15 (1926), 464.
14. W. H. Schulze, *Ibid.*, 15 (1926), 965.
15. E. Goodman, PROC. A. PH. A., 37 (1889), 100.
16. Wm. Procter, Jr., *Amer. J. Pharm.*, 19 (1847), 93.
17. "British Pharmaceutical Codex," (1923), 157.
18. L. A. Brown, *Ky. Ag. Exp. Sta. Bull.*, No. 150, p. 154; through JOUR. A. PH. A., 14 (1925), 509.
19. H. V. Arny, "Principles of Pharmacy," 3rd Edition (1926), 516.
20. E. Warburg and W. Rump, *Z. Physik*, 47 (1928), 305–322; through *Chem. Abstr.*, 22 (1928), 1912.
21. Guyot, *Bull. soc. pharm. Bordeaux*, 63 (1925), 214–216; through *Chem. Abstr.*, 20 (1926), 965.

COLLEGE OF PHARMACY,
UNIVERSITY OF FLORIDA,
GAINESVILLE, FLA.

ABSTRACT OF DISCUSSION.

E. Fullerton Cook inquired if it is desirable to widen the range of possible deterioration, because of deterioration of the product.

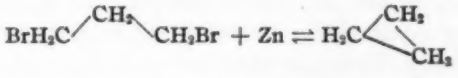
W. J. Husa replied that this would hardly seem feasible since the solution commonly shows 30 to 50 per cent deterioration. So many methods of increasing the stability have been found that it is difficult to select the best one. Further work is in progress in which ten solutions stabilized in different ways have been stored under drug store conditions and are being analyzed every three months. He concluded by saying that unless the formula is changed the solution should be freshly prepared.

THE PREPARATION OF CYCLOPROPANE.*

BY W. A. LOTT AND W. G. CHRISTIANSEN.

Trimethylene (cyclopropane) is the simplest cyclic hydrocarbon; its preparation in the pure state and in large quantities has been studied by a number of investigators whose various results are not entirely in agreement. We found none of the recorded methods entirely satisfactory.

All of the practical methods are based on the reduction of[1] trimethylene dibromide with metallic zinc in an alcoholic solution.



Freund, (*J. prakt. Chem.* (2), 26 (1886), 368) reduced trimethylene dibromide with sodium, in alcoholic solution. His product was not entirely pure, but he mentioned only propylene, its more stable isomer, as an impurity.

---

* Scientific Section, Rapid City meeting, 1929.

[1] Made according to method outlined in Organic Syntheses, Vol. I, R. Adams.

A little later, Gustavson (*J. prakt. Chem.* (2), 36, 300) described the preparation of this hydrocarbon from trimethylene dibromide using zinc dust as the reducing agent and 75% ethyl alcohol as the solvent. He obtained a rapid evolution of the gas at 50–60° C. and pointed out that the analogous reduction of propylene dibromide to form propylene is even more rapid. The use of absolute alcohol decreases the rate of delivery of the gas. The trimethylene obtained by this method contained only small quantities of propylene and hydrogen.

Wolkoff and Menschutken (*Centralblatt* (1900), II, 43) repeated the work of Gustavson but claimed to have obtained about 25% of the isomer, propylene, and some propane and hydrogen as impurities. They also disclaimed the practicability of Freund's method. These authors later again discussed Gustavson's work (*Berichte*, 31 (1898), 3067); they prepared pure trimethylene by passing the gas (evolved by the reduction of the bromide) through bromine water which removes propylene as the dibromide but does not affect trimethylene.

Gustavson (*J. prakt. Chem.*, 59 (1899), 302) rediscussed his earlier work and offered certain improvements. He explained Wolkoff and Menschutken's failure to obtain trimethylene free from propylene as lying in the incomplete removal of propylene dibromide from the trimethylene dibromide and disclosed some later results in which he was able to obtain trimethylene free from propylene by discarding the gas evolved at the beginning of the reaction; pointing out that propylene dibromide is reduced so much more readily than is trimethylene dibromide that it will react completely before the trimethylene dibromide is materially attacked.

Fornoe (*Berichte*, 21, 1283) repeated the before-mentioned Gustavson's experiment and confirmed his result. Haehn (*Arch. Pharm.*, 245, 518) used amyl alcohol instead of ethyl alcohol with somewhat poorer results. Willstäter and Bruce (*Berichte*, 40 (1907), 4456) also repeated Gustavson's work and confirm that pure trimethylene *can* be prepared by his method provided the precautions outlined in his later work are adhered to.

Trautz and Winkler (*J. prakt. Chem.*, 104 (1922), 37) in a review of the subject throw doubt upon the purity of the trimethylene prepared by the earlier methods and describe a method for the preparation of the gas in large quantities. They use amyl alcohol for the solvent and zinc wool for the reducing agent. They advise a rather higher temperature 130° C., which is probably necessitated by the less finely dispersed form of zinc. They obtained a very pure product by a very burdensome fractional distillation which requires a very complicated apparatus.

A number of trials, in this laboratory, with the method of evolution used by Trautz and Winkler gave small yields of gas which were about 95% absorbed by fuming sulphuric acid; in each run additional portions of gas were obtained which were contaminated by saturated hydrocarbons and hydrogen. In one experiment in which smooth delivery of gas was obtained at 110° C., two carboys of about 40 liters each, obtained from 1600 Gm. of trimethylene bromide, were 69% and 29% absorbable by fuming sulphuric acid. The remainder of the gas was largely saturated hydrocarbon and hydrogen.

In one attempt with Gustavson's method smooth evolution of gas began at 48° C., but the temperature had to be progressively increased to the boiling point of the alcohol. The product was 95.5% absorbed by fuming H_2SO_4; but only a

very small quantity was collected before evolution stopped, due to the settling and caking of the zinc dust. The substitution of zinc shavings reduced the quality of the product.

It was evident, therefore, that the reaction used by Trautz and Winkler gave a product which was unsatisfactory unless the separation of large quantities of lower boiling hydrocarbons by the very inconvenient fractional distillation at low temperature was performed; the boiling point of trimethylene being —34° C. Also, the method of Gustavson was not useful without considerable modification for the preparation of fairly large quantities of material.

The following apparatus was used with what was otherwise essentially Gustavson's method, and very satisfactory results were obtained.

The trimethylene bromide was fed into the reaction flask at uniform speed by nitrogen pressure from the reservoir. This allows the boiling temperature of the solvent to be used uniformly throughout the reaction, without violent evolution at

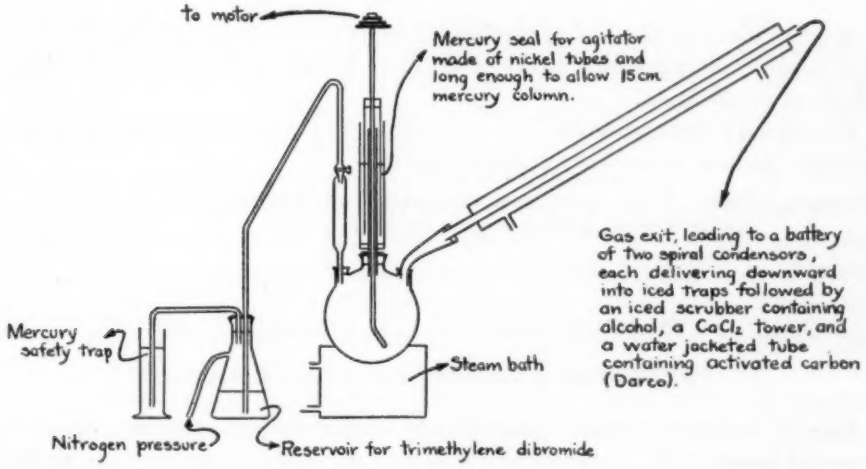

to motor
Mercury seal for agitator made of nickel tubes and long enough to allow 15 cm. mercury column.
Gas exit, leading to a battery of two spiral condensors, each delivering downward into iced traps followed by an iced scrubber containing alcohol, a $CaCl_2$ tower, and a water jacketed tube containing activated carbon (Darco).
Mercury safety trap
Steam bath
Nitrogen pressure
Reservoir for trimethylene dibromide

Fig. 1.

any time. At this temperature the reduction of the bromide to trimethylene is so rapid that side reactions are precluded. Rapid agitation prevents caking of the zinc dust and allows the exposure of fresh zinc surface to the bromide at all times and thereby deters side reaction and prevents the premature cessation of the desired reaction.

A series of spiral condensers and iced traps serve to retain the larger portions of the trimethylene dibromide, which in spite of its high boiling point is very volatile even at ordinary temperature. The last traces of these vapors are removed by a water-cooled column of granular activated carbon (Darco). The gas is dried by a $CaCl_2$ tower previous to exposure to this absorbent. Now the product may be collected as a gas or liquified in a copper coil surrounded by solid CO_2.

The agitator must be protected by a mercury seal in which the mercury column is about 15 cm. high, in order to prevent the leakage of gas when the reaction is well under way.

Three thousand cc. ethyl alcohol (95%) and 300 cc. water are placed into the

3-neck 5-liter Pyrex flask. The agitator is started, and 2000 Gm. zinc dust added. This precaution prevents any caking. The temperature is now raised to the boiling point of the diluted alcohol by a steam-bath, and 1600 Gm. of trimethylene dibromide (boiling at 162–164° C. uncorrected) which has been treated previously with 160 Gm. of zinc dust at room temperature is fed into the flask at a rate which will just maintain a smooth flow of gas. The gas so obtained was 99.5–100% absorbed by fuming sulphuric acid, and a 100-cc. sample left an acidified solution of 20 cc. $N/5$ $KBrO_3$ unaffected; indicating freedom from propylene.

We condensed the trimethylene from a typical experiment by a coil cooled by solid CO_2 and collected about 250 Gm. of liquid. This represents a yield of approximately 80%. No attempt was made to collect the largest possible yield.

Even though trimethylene is capable of producing anæsthesia when administered by inhalation, our results indicate that the margin of safety is too small for practical use.

SUMMARY.

A convenient method of preparing trimethylene with a high degree of purity and in substantial quantities has been developed, without recourse to burdensome methods of purification.

Preliminary tests indicate that this gas is not suitable for use as a general anæsthetic because of its low margin of safety.

RESEARCH DEPT. OF THE CHEMICAL & PHARMACEUTICAL LABORATORIES,
E. R. SQUIBB & SONS, BROOKLYN, NEW YORK.

A THOUGHT ON THE PLACE OF VOLATILE OILS IN PLANT ECONOMY.*

BY FREDERICK E. MARSH AND WILMA K. MAUS.

One of the most constant observations of the student of living things is the purposeful intent of the various devices of nature. While some seem quite obscure and some uncertain, the obviousness of others seems to guarantee a certain definite usefulness for all. Thus it is commonly accepted. The purpose of many devices is traditionally accepted, of many we find divergent and changing views, of some we will probably always be in doubt.

The question of the purpose of the class of products commonly termed volatile oils occurred to us several years ago. A class of secretions so widely distributed in the plant kingdom, consistently found in many species and produced with such definite intent, as the special structures which bear them would indicate, must certainly be developed for a very definite purpose to the plant. Certain general values have been ascribed to volatile oils and traditionally accepted, such as the attraction of insects to aid in pollination, the repulsion of animal life which might be detrimental to the species (6), etc. These go unchallenged. Nor is it the intent of this paper to challenge them, but we intend to show that volatile oils as a class serve an added and very important purpose.

In the literature of the past we find very few references made to the biological function of volatile oils. In Asa Gray's "Introduction to Structural and Syste-

* Scientific Section, A. PH. A., Rapid City meeting, 1929.

matic Botany and Vegetable Physiology" (2), published in the year 1858, we find the following statement regarding these:

> These are some of the Proper Juices of plants, peculiar to certain species, and occurring under a great number of forms in different species. It is not known if they are of any account in vegetable growth or nutrition....Not knowing of what use they are to the vegetable, we are inclined to regard them as of the nature of excretions.

In "Practical Plant Physiology" by Dr. W. Detmer (1), Professor of Botany of the University of Jena we read the following:

> Etherial oils, in many cases, are certainly not to be regarded as excreta but as secretions, that is, as bodies with definite physiological function (to attract creatures necessary for the transference of pollen, to keep away injurious creatures, etc.)....It is further instructive to verify the fact that the fruits of many *Umbelliferæ* are rich in etherial oil, occurring here in intercellular spaces and evidently functioning as a protection against injurious animals.

In most works on plant physiology we find that only casual reference is made to volatile oils and then only these traditional functions are ascribed.

In a search for further purpose we directed our inquiry to the effects produced by volatile oils, first in our own field, as used in medicine. Since they are so different in chemical composition we should expect to find a great variance in their medicinal action. This, of course, we know is true. But we find that practically all are said to have some antiseptic or germicidal action (7). This appeared to be a common property in a greater or lesser degree possessed by all members of the group. The thought then occurred that possibly many volatile oils actually serve a protective function for the plants which bear them. Since one of the most outstanding properties of living things is the power to resist chemical decomposition it did not seem unreasonable to suspect that volatile oils are devices of plants serving to protect against bacterial invasion.

Our problem, then, was to determine whether volatile oils were capable of affording such protection; if not all, whether those produced in certain organs of the plant possessed this power. It might be that those produced by certain types of structures were for protection.

The germicidal power of many volatile oils have been quite thoroughly studied. Most of these were studied by different individuals and the degree of toxicity arrived at in different ways. Thus it was found that available records did not furnish valid information for comparison. So it was decided to make new determinations from a selected list of oils using an identical technique in every case.

MATERIALS.

1. *Volatile Oils.*

Oil of Bergamot	Oil of Juniper	Oil of Peppermint
Oil of Cajuput	Oil of Lavender	Oil of Pimenta
Oil of Caraway	Oil of Mustard	Oil of Rosemary
Oil of Clove	Oil of Cubeb	Oil of Thuja
Oil of Dwarf Pine Needles	Oil of Myrcia	Oil of Thyme (White)
Oil of Eucalyptus	Oil of Sweet Orange Peel	Oil of Turpentine
		Oil of Orange Flower

The oils were supplied by a local wholesaler and were of official standard. Only one specimen of each oil was used.

2. Bacteria.

Bacillus Anthracis
Bacillus Typhosus
Bacillus Coli Communis
Staphlococcus Pyogenes albus

Organism A (a gram positive bacillus obtained from a decayed tomato)

Organism B (a gram negative bacillus obtained from a decayed pear)

3. Medium.

Nutrient Agar.

METHOD USED.

The method for obtaining Phenol Coefficient could not be used since the volatile oils could not be diluted with an inert diluent; they were either germicidal themselves or tended to prevent penetration. This made it imperative that time be used as the variable factor and that the pure oil be used in the tests.

Three drops of the oil were placed in a sterilized test-tube. A loopful of bacteria obtained from a 24-hour old culture was thoroughly mixed with the oil. From this inoculations were made upon an agar plate at intervals of one minute up to ten minutes, then every five minutes up to fifty and then every ten minutes up to ninety. The plate was incubated for 48 hours. The shortest period of time beyond which no growth was obtained was recorded. This was repeated for each organism with each oil. An old sporulated culture of *Anthrax* was also used. The figures obtained were used as the basis of comparison.

The results of the work are indicated in the following tables. The figures show the number of minutes beyond which no growth was obtained. Many of the figures do not indicate the even five- or ten-minute intervals. This is due to the fact that they represent the average of several determinations. The (*) indicates that growth took place after ninety minutes' exposure to the action of the oil.

TABLE I.—OILS DERIVED FROM LEAVES (8).

	Organism A.	Organism B.	*Bac. Anthracis* 24 hrs.	*Bac. Anthracis* spore.	*Bac. Typhosus.*	*Bac. coli.*	*Staph. Pyog. alb.*
Oil of Dwarf Pine Needles	23	15	60	90	37	23	30
Eucalyptus	*	53	90	*	53	53	*
Thuja	37	1	53	*	1	53	53
Cajuput	23	23	60	90	60	23	90
Myrcia	1	1	2½	60	10	10	1

TABLE II.—OILS DERIVED FROM LEAVES AND FLOWERING TOPS (8).

	Organism A.	Organism B.	*Bac. Anthracis* 24 hrs.	*Bac. Anthracis* spore.	*Bac. Typhosus.*	*Bac. coli.*	*Staph. Pyog. alb.*
Oil of Lavender	45	15	*	*	60	45	*
Peppermint	10	10	*	*	45	10	1
Rosemary	23	15	35	90	45	15	23
Thyme	10	10	37	*	10	10	2½

TABLE III.—OILS DERIVED FROM FRUITS (8).

	Organism A.	Organism B.	*Bac. Anthracis* 24 hrs.	*Bac. Anthracis* spore.	*Bac. Typhosus.*	*Bac. coli.*	*Staph. Pyog. alb.*
Oil of Bergamot	53	15	41	60	37	53	1
Cubeb	1	15	15	90	30	1	1
Juniper	37	1	45	*	45	37	90
Orange Peel	15	1	37	53	15	10	1
Caraway	22	22	60	90	60	45	22
Pimenta	1	1	37	53	23	23	1

TABLE IV.—OILS DERIVED FROM OTHER SOURCES (8).

	Organism A.	Organism B.	*Bac. Anthracis* 24 hrs.	*Bac. Anthracis* spore.	*Bac. Typhosus.*	*Bac. coli.*	*Staph. Pyog. alb.*
Oil of Orange Flower (petal)	30	15	45	*	45	15	45
Clove (receptacle)	15	1	22	37	1	30	1
Mustard (from glucoside in seed)	53	15	53	*	53	53	*

TABLE V.—OILS DERIVED FROM INTERNAL GLANDS.

	Organism A.	Organism B.	*Bac. Anthracis* 24 hrs.	*Bac. Anthracis* spore.	*Bac. Typhosus.*	*Bac. coli.*	*Staph. Pyog. alb.*
Oil of Caraway	22	22	60	90	60	45	22
Clove	15	1	22	37	1	30	1
Dwarf Pine Needles	23	15	60	90	37	23	30
Eucalyptus	*	53	90	*	53	53	*
Juniper	37	1	45	*	45	37	90
Orange Peel	15	1	37	53	15	10	1
Thuja	37	1	53	*	1	53	53
Turpentine	15	15	45	90	15	45	30
Bergamot	53	15	41	60	37	53	1
Pimenta	1	1	37	53	23	23	1

TABLE VI.—OILS DERIVED FROM GLANDULAR TRICHOMES.

	Organism A.	Organism B.	*Bac. Anthracis* 24 hrs.	*Bac. Anthracis* spore.	*Bac. Typhosus.*	*Bac. coli.*	*Staph. Pyog. alb.*
Oil of Lavender	45	15	*	*	60	45	*
Myrcia	1	1	2½	60	10	10	1
Peppermint	10	10	*	*	45	10	1
Rosemary	23	15	35	90	45	15	23
Thyme	10	10	37	*	10	10	2½

TABLE VII.—AVERAGES.

	Leaves.	Leaves and tops.	Fruits.	Int. glands.	Trichomes.
Ave. time in min. to kill saprophytes	19.7	17.2	15.3	17.5	14
Ave. time in min. to kill all vegetative forms	34.3	22.7	25.4	29.2	16.8
Percentage of vegetative forms killed within 90-min. period	93.3%	87.5%*	100%	96.6%	90%*

* The lowness of these figures may be due to the fact that spores had formed in the 24-hour old culture of *anthrax* as failure to kill was noted almost always in the 24-hour *anthrax* column.

According to Hiss & Zinsser (3), anthrax spores are killed by 1:2000 solution of mercuric chloride in 40 minutes but may remain alive as long as 40 days in 5% phenol; typhoid is killed in 5 minutes by either a 1:5000 solution of mercuric chloride or 5% phenol. The same authority gives ten minutes as the time required by a 1:1000 solution of mercuric chloride and 35 minutes as the time required by 1% phenol to kill the staphlococci. A comparison with our tables shows that many of our volatile oils are much more germicidal than these accepted agents, while some are relatively mild in their action.

CONCLUSIONS.

1. All the volatile oils investigated have some germicidal action.
2. Several are exceptionally powerful germicides.

3. There is a great variance in the power of a volatile oil to kill different organisms.

4. There is only a slight difference in the relative germicidal powers of oils from various plant organs. The fruit oils are most germicidal followed in order by those from leaves and flowering tops, leaves, and flower.

5. The volatile oils produced by glandular trichomes are relatively more germicidal than those produced by internal glands.

6. Volatile oils, as a class, are capable of affording protection against bacterial invasion irrespective of organ or structure from which they are derived. Some, however, seem to be much more highly specialized for this purpose than others.

REFERENCES.

(1) W. Detmer, "Practical Plant Physiology," trans. S. A. Moor, The Macmillan Co., Philadelphia (1898), 338.

(2) Asa Gray, "Introduction to Structural and Systematic Botany and Vegetable Physiology," Ivison & Phenney, New York (1858), 57.

(3) P. H. Hiss and Zinnsser, "A Text Book of Bacteriology," D. Appleton & Co., New York and London (1918), 271.

(4) Edwin Jordan, "General Bacteriology," W. B. Saunders, Philadelphia (1928), 338.

(5) Henry Kraemer, "Scientific and Applied Pharmacognosy," John Wiley & Sons (1920), 283, 466.

(6) Henry Kraemer, "Applied and Economic Botany," Kraemer (1916), 231.

(7) T. Sollmann, "The Action of Drugs," W. B. Saunders Co., Philadelphia (1917), 121.

(8) H. W. Youngken, "Pharmacognosy," P. Blakiston's Sons & Co., Philadelphia, Pa. (1926), 78, 152, 422.

ABSTRACT OF DISCUSSION.

George F. Reddish said the paper was rather surprising, especially from the standpoint of the germicidal action against anthrax spores. He asked the author whether, after transferring the mixture of essential oils and the culture to agar plates the plates were streaked so that the organisms would grow if not killed. He also asked the age of the anthrax spores, and on what medium they were grown, and remarked that the killing of anthrax spores is very difficult for any germicide—there have been specimens in which the spores survived several years. Tincture of iodine is one of our very strongest germicides and it does not kill within a half hour or more; so the condition of a spore, its resistance, and the medium on which it has been grown, is a very important point in this particular study.

The author replied that the anthrax was approximately a week old; he did not carry over from each week's work; fresh agar was made and the old culture used; they were transferred to agar plates and not spread over the plate, inoculations were short streaks.

George F. Reddish said that if the essential oils prove to be as highly germicidal as indicated in the reported work, the author has made a good start in the study of germicides; he expressed a desire to investigate.

The author stated that the work was prompted by an observation made by Professor Duffy, that anthrax spores were quite readily killed with oil of orange; he had carried the work further by adding the organism to egg albumen and then testing the germicidal value of oil of orange.

Seventy-eighth annual meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION during week of May 5th, in Baltimore.

A PHARMACEUTICAL STUDY OF HYDRASTIS CANADENSIS.*

BY RUBY HIROSE AND H. A. LANGENHAN.

HISTORY.

Hydrastis canadensis (1) is a native of North America belonging to the *Ranunculaceæ* family. Once abundant in the thick woodlands of the territory bordering the Ohio River from Illinois to Virginia and in Northern Wisconsin, it is now, in its native home, practically exterminated. The rhizome of this plant having a golden yellow color, was used by the Indians as a cuticle stain, and also as a dye for garments. The latter application was adopted by the early settlers. As would be expected, the general use of this native plant in trade and barter resulted in a host of names, some of which are as follows (2):

Yellow Puccoon, Yellow Root, Indian Dye, Ground Raspberry (due to its red fruit), Eye Balm, Ohio Curcuma, Indian Paint, Indian Turmeric, Yellow Seal, Yellow Eye Root, Orange Root, Jaundice Root, Gelbes Blutkraut (German), Sceau d'Or (French), Warneria canadensis (Latin).

The name "Hydrastis" (3) is derived from "hudor" water and "drao" to act, alluding to the growth of the plant in marshes and the active properties of the juice. The name (4) "Hydrastis" was also given by Linnæus. Peter Kalm collected a few leaves between 1749 and 1751, which were sent to Linnæus (1753), who called the plant *Hydro-phyllum verum canadense.* In 1759, he, after seeing a complete specimen, renamed it "Hydrastis."

The Indians not only used the plant as a dye, but are credited with its use in medicine and introducing such use to the settlers. Mixed with grease it was found to be a good insecticide, presumably because of the bitter taste. In form of an infusion it was used in the treatment of skin diseases and for sore or inflamed eyes. It was used as a stimulant for indolent ulcers and as an internal tonic. Many others uses have been reported as having been employed by either the Indians or the early settlers. The drug as a whole was of little importance commercially until introduced to the medical world by the American Eclectics (1), who first prepared the alkaloidal salts for medicinal uses. Then in 1828 (5), Martin and Refinesque mentioned the drug in their Materia Medica.

Captain Lewis (6) (1804) included among the herbarium collected by the Lewis and Clark expeditioners a short article on "Hydrastis canadensis." In the log, Hydrastis was said to be "a sovereign remedy in a disorder common to the inhabitants of that locality." The preparation and application of this remedy is given as follows:

Having procured sufficient quantity of the roots, wash them clean and dry them in the shade, break the roots as fine as possible with the fingers, place them in a glass vessel about two-thirds full, add rain or river water until the vessel is filled, shaking it frequently, and it will be fit for use in the course of six hours. The water must be decanted, but remaining with the root is to be frequently applied by wetting a piece of linen and touching the eye gently with it.

Hydrastis appears in the 1830 (N. Y.) revision of the U. S. Pharmacopœia, then again in the secondary list of the 1860 revision. All subsequent revisions of the U. S. P. have retained it. The 1870 revision introduced the Fluidextract and

* Scientific Section, A. PH. A., Portland, Me. meeting, 1928.

the 1880 revision added the Tincture. In 1890 the Glycerite was made official and the first alkaloidal salt, Hydrastinine Hydrochloride was added. The 1900 revision included the alkaloid Hydrastin. The 1910 revision retained all of the above mentioned, while the 1920 revision deleted all but Hydrastis and the Fluidextract. The Extract of Hydrastis, the Tincture of Hydrastis and the alkaloidal salt, Hydrastine Hydrochloride, have been included in the National Formulary (1920). The 1910 revision of the National Formulary introduced two galenicals, Mistura Rhei Alkalina, containing some fluidextract and Liquor Hydrastinæ Compositus containing hydrastin hydrochloride. The 1920 revision added to these Elixir Hydrastis Compositus containing some fluidextract.

The table which follows offers a summary (7) of the U. S. P. and N. F. history of Hydrastis and its preparations.

The numbers at the top of the columns indicate the date of decennial revisions. In the case of the 1830 conventions the number with the asterisk indicates the Pharmacopœia published by the New York Convention, the other of the Philadelphia Convention.

The capitals in the columns stand for the Latin title (L), English title (E), synonyms (S) and official abbreviation (A).

U. S. Pharmacopoeia.	20.	30.	30.*	40.	50.	60.	70.	80.	90.	00.	10.	20.
EXTRACTUM HYDRASTIS											L	...
Extract of Hydrastis											E	...
Extract of Goldenseal											S	...
Powdered Extract of Hydrastis											S	...
Ext. Hydrast											A	...
FLUIDEXTRACTUM HYDRASTIS										L	L	L
Fluidextract of Hydrastis										E	E	E
EXTRACTUM HYDRASTIS FLUIDUM							L	L	L	S	...	...
Fluidextract of Hydrastis							E	E	E	...	S	...
Fluidextract of Goldenseal											S	S
Fldext. Hydrast.											A	A
GLYCERITUM HYDRASTIS									L	L	L	...
Glycerite of Hydrastis									E	E	E	...
Glycerite of Goldenseal											S	...
Glycer. Hydrast											A	...
HYDRASTINA										L	L	...
Hydrastine										E	E	...
HYDRASTINÆ HYDROCHLORIDUM											L	...
Hydrastine Hydrochloride											E	...
Hydrastine Chloride											S	...
Hydrastin. Hydrochl											A	...
HYDRASTININÆ HYDROCHLORIDUM										L	L	...
Hydrastinine Hydrochloride										E	E	...
HYDRASTININÆ HYDROCHLORAS									L	S	...	...
Hydrastinine Hydrochlorate									E	...	...	...
Hydrastinine Chloride											S	...
Hydrastinin. Hydrochl											A	...
HYDRASTIS						LE	LE	LE	LE	LE	LE	LE
Golden Seal								S	S		S	S
HYDRASTIS RADIX		L										
Yellow Root		E										
Yellow Puccoon		S										

U. S. Pharmacopoeia.	20.	30.	30.*	40.	50.	60.	70.	80.	90.	00.	10.	20.
TINCTURA HYDRASTIS	..	..	..	..	..	...	...	L	L	L	L	...
Tincture of Hydrastis	..	..	..	..	..	...	...	E	E	E	E	...
Tincture of Golden Seal	..	..	..	..	..	...	...	...	...	...	S	...
Tr. Hydrast	..	..	..	..	..	...	...	...	...	...	A	...

National Formulary.	20.	30.	30.*	40.	50.	60.	70.	80.	90.	00.	10.	20.
ELIXIR HYDRASTIS COMPOSITUM	..	..	..	..	..	...	...	...	...	...	...	L
Compound Elixir of Hydrastis	..	..	..	..	..	...	...	...	...	...	...	E
Alkaline Elixir	..	..	..	..	..	...	...	...	...	...	...	S
Elix. Hydrast. Co	..	..	..	..	..	...	...	...	...	...	...	A
EXTRACTUM HYDRASTIS	..	..	..	..	..	...	...	...	...	...	...	L
Extract of Hydrastis	..	..	..	..	..	...	...	...	...	...	...	E
Powdered Extract of Hydrastis	..	..	..	..	..	...	...	...	...	...	...	S
Ext. Hydrast	..	..	..	..	..	...	...	...	...	...	...	A
LIQUOR HYDRASTINÆ COMPOSITUS	..	..	..	..	..	...	...	...	...	...	L	L
Compound Solution of Hydrastine	..	..	..	..	..	...	...	...	...	...	E	E
Colorless Hydrastine Solution	..	..	..	..	..	...	...	...	...	...	S	S
Liq. Hydrast. Co	..	..	..	..	..	...	...	...	...	...	A	A
TINCTURA HYDRASTIS	..	..	..	..	..	...	...	...	...	...	...	L
Tincture of Hydrastis	..	..	..	..	..	...	...	...	...	...	...	E
Tincture of Goldenseal	..	..	..	..	..	...	...	...	...	...	...	S
Tr. Hydrast	..	..	..	..	..	...	...	...	...	...	...	A
HYDRASTINÆ HYDROCHLORIDUM	..	..	..	..	..	...	...	...	...	...	...	L
Hydrastine Hydrochloride	..	..	..	..	..	...	...	...	...	...	...	E
Hydrastine Chloride	..	..	..	..	..	...	...	...	...	...	...	S
Hydrastin. Hydrochl.	..	..	..	..	..	...	...	...	...	...	...	A
MISTURS RHEI ALKALINA	..	..	..	..	..	...	...	...	...	...	L	L
Alkaline Mixture of Rhubarb	..	..	..	..	..	...	...	...	...	...	E	E
Neutralizing Cordial	..	..	..	..	..	...	...	...	...	...	S	S
Mist. Rhei. Alk.	..	..	..	..	..	...	...	...	...	...	A	A

REFERENCES.

(1) Lloyd, "Origin and History of Vegetable Drugs," Vol. 1.

(2) Culbreth, "Materia Medica and Pharmacology."

(3) "Homeopathic Pharmacopœia of the U. S.," 3rd Edition (1914). "U. S. Dispensatory," 21st Edition (1926).

(4) *Pharmaceutical Era*, 46 (1913), 67.

(5) YEARBOOK, A. PH. A., 1 (1912), 115.

(6) *Journal of Pharmacy*, 6 (1834), 201.

(7) Langenhan, "A Century of the U. S. P. 1820–1920." "Titles, Synonyms and Abbrev." (1923).

(7) Langenhan, "A Half-century of the N. F. Titles, Synonyms and Abbrev." (1927).

CULTIVATION OF HYDRASTIS CANADENSIS.

Since the first appearance of Hydrastis into medicine in 1828, the drug plant has become scarce. In 1860, a commercial demand was created. In 1880, the prices ranged from 18 cents per pound to 12 cents per pound. These prices were based on the cost of collecting the drug and curing it. In 1890, the coming scarcity of the drug plant caused an increase in prices, and at the end of ten years the price had advanced to 58 cents per pound. In 1904, Hydrastis brought $1.00 per pound, gradually advancing to $1.35 to $1.50 per pound at the close of the year (1).

Up to 1912, the prices did not fluctuate to any great extent and the prices paid to collectors ranged from $3.00 to $4.25 per pound. Parallel to this steady advance in price came the gradual extermination of the natural grown plant and at the same time its increasing use in the medical field.

The collectors had diminished the natural supply (2) by careless harvesting. As a result, the Bureau of Plant Industry in the Department of Agriculture in 1911 introduced a campaign to induce artificial cultivation. In 1912 (3), Lloyd visualized the danger in Hydrastis shortage, took steps to protect the popular drug plant. He experimented (6) in the culture by transplanting the fresh green Hydrastis collected from various parts of Kentucky. One lot was planted in rows, about two feet apart, the plant separated from each other about six inches in the row. All grew that season. These plants were set out the first part of May. Small number of plants were set out a little later to prove whether the time of transplanting had any effect on the thriftiness and hardiness of the plants. The experiment showed that early planting is better. Next, five lots were planted in a woodland with a southeast exposure, the thicket so dense as to prevent the hot sun shining upon them during the summer. At the same time fresh roots were cut up into pieces, each bearing one or more reserve buds and these were planted. In both cases the plants developed successfully. The experiments demonstrated that Hydrastis is a plant easily propagated by transplanting the entire roots, or even cuttings.

At the beginning of the experiment, Hydrastis was said to grow best in its natural habitat (7), but further investigation proved that it will grow in most any climate provided proper care is given. Hydrastis has been grown successfully in Russia (4) and Austria (5).

The artificial condition for cultivation must be made as near as possible to the natural habitat since the plant is very sensitive to any disturbance (8). A light rich soil is best, and either clay or sand will do, if the ground is manured well to give the right lightness and fertility. Humus should be worked into the ground six to eight inches in depth to assure the lightness and moisture retaining the property resembling that of the natural soil. Manure and straw will do, but leaf mold is recommended. The ground should be mulched every fall; this also prevents the weeds from growing (7). All stones, lumps and grass must be removed. Good drainage is required in the successful growing of Hydrastis (9). The soil cannot be made too rich, for Hydrastis is a hardy plant and depletes it readily.

The soil is best prepared in the summer and the plants set out in the fall, so that by spring they will be growing well. The plants are more vigorous during the succeeding year (6).

When the plants were numerous in the wilds, the growers collected the green plants in the early spring (10) and transplanted them, preferring this to seed planting. Very frequently the birds feast on the seeds and the development requires a long time before marketing, whereas, three to four years is the time required for plants grown from cuttings or buds, and five or more years, from the seed.

The plant is best propagated (7) by division of the rhizome for continuous growth; by transplanting the entire root; or by buds, having a good fibrous root attached (9).

The cuttings will thrive best if they are planted an inch below the surface, a few inches apart in rows to afford access to plants in the weeding and the tilling of the soil. When the plants commence to peep out from the soil they are ready for transplanting to a new bed. In a few months, all of the plants will be growing well (11).

The beds must be protected from the hot sun, hence artificial shade must be provided. This is done by erecting a lattice framework (8), which is better than trees or vines, as the latter draw their share of the food from the soil.

Late in the fall, the beds should be covered with forest leaves or straw to the depth of two or three inches to protect the plants from the extreme cold; too deep a covering is harmful, because it invites the field mice to infest the field (9).

In four to six years, and after the leaves are all withered, the rhizome should be dug out and three-fourths of it cut off; the growing and carrying the terminal bud, being replaced in the earth, to continue the growth. Small plants that thrive from the mother plant can be transplanted to a new place for another (3) crop.

Successful growers have an output of about two thousand pounds of dried root per acre after five years of growth from seed (1) and similar returns from the cuttings.

The above summary represents the information on Hydrastis cultivation obtained from available literature. It will be noted that no references are given later than 1913. During the last decade much has been done on improved methods of cultivation by private growers. However, little information is available as to these improvements. Unquestionably the climatic conditions influence the technique of cultivation and collection. There can be no doubt but that the procedure of the growers of the Wisconsin and Ohio differs from that of the Puget Sound area, because of the difference in the climate.

The question of spring digging *versus* fall digging is yet unsettled. The value of September digging as compared to November digging must also be investigated. Fortunately, materials can be obtained from the Skagit Valley Golden Seal Farm at any time, and as time passes it is hoped that some specific data may be obtained that will clear up these questions, at least for the Puget Sound area.

REFERENCES.

(1) U. S. Department of Agriculture, *Bulletin* No. 61.
(2) *Bulletin of Pharmacy*, 25 (1911), 400.
(3) YEARBOOK, A. PH. A., 1 (1912), 115.
(4) *Ibid.*, 2 (1913), 211.
(5) *Ibid.*, 8 (1919), 235.
(6) PROC. A. PH. A., 53 (1905), 307.
(7) *Bulletin Pharmacy*, 19 (1905), 325.
(8) Bureau of Plant Industry, *Circular* No. 6.
(9) *A. J. P.*, 85 (1913), 143.
(10) *Ibid.*, 84 (1912), 299–300.
(11) JOUR. A. PH. A., 1 (1912), 5.

(*To be continued*)

"The greatest single administrative need of the Public Health Service is uniformity of method of appointment and status of this scientific personnel."—The Parker Bill was signed by President Hoover on April 9th, it is a step in progress of the Service.

THE BIOASSAY OF EPINEPHRINE-PROCAINE MIXTURES.*

BY JAMES C. MUNCH AND W. ALLEN DECKERT.

For the production of local anæsthesia in dental practice, a commonly employed epinephrine-procaine mixture contains twenty milligrams of procaine and 0.04 milligram of epinephrine per cc., or per tablet. The ratio of procaine to epinephrine is 500 to 1. The chemical determination of this small quantity of epinephrine in the mixture is quite complicated. Our attention was directed to the possibility of physiologically assaying a number of these samples by the method outlined in U. S. Pharmacopœia X for the bioassay of epinephrine solution.

A series of increasing doses of standard epinephrine were administered intravenously to anæsthetized dogs to determine the sensitivity of the test animals. Efforts were made to inject doses which would produce a rise of about thirty millimeters in blood pressure. Results obtained were then plotted and the dose determined which would produce that increase. The epinephrine-procaine solutions, prepared by mixing standard epinephrine with procaine hydrochloride, were then injected, giving the same quantities of epinephrine as had been given of standard. The increases in blood pressure were plotted in the same manner and the dose producing exactly thirty millimeters' increase determined. Then a final series of injections of standard epinephrine were made to determine any potentiation of pressor response following procaine, and the results plotted to determine the dose producing a thirty-millimeter increase.

The U. S. Pharmacopœia specifies that a suitable quantity of epinephrine produces a rise of thirty to sixty millimeters in blood pressure. In these investigations, many of the test doses gave increases of about thirty millimeters so that figure was selected solely as a matter of convenience. By using a constant degree of response to epinephrine, the great variability of different dogs to the action of epinephrine may be overcome, at least in part. The same quantity of epinephrine injected into the same dog produces essentially the same increase in blood pressure. However, when the same quantity of epinephrine was injected into each of a series of dogs, some animals gave ten times as large an increase in blood pressure as others.

Hatcher (1) shows a tracing in which procaine has greatly potentiated and prolonged the action of epinephrine. Apparently the mixture contained five hundred parts of procaine to one part of epinephrine. Tainter (4) has not obtained evidence of definite potentiation following procaine in his work.

In our experiments, mixtures were made in which the procaine:epinephrine ratio varied from 50:1 up to 1000:1. The detailed results of individual injections

TABLE I.—MICROGRAMS OF EPINEPHRINE REQUIRED TO PRODUCE RISE OF 30 MILLIMETERS IN BLOOD PRESSURE OF ANÆSTHETIZED DOGS.

		Ratio of Procaine to Epinephrine Injected.							
Chart no.	Epinephrine.	50.	100.	125.	250.	375.	500.	750.	1000.
169	20	32	—	22	12	15	15	—	—
		30	—	15	20	17	16	—	—
170	88	—	88	—	62	—	45	45	45
		—	62	—	50	—	45	45	45
171	32	—	—	—	—	—	32	—	—
		—	—	—	—	—	32	—	—

* Scientific Section, A. PH. A., Rapid City meeting, 1929.

have been consolidated in Table I, which shows the quantity of epinephrine required to produce an increase of thirty millimeters in blood pressure. The values given for epinephrine alone refer to the U. S. Pharmacopœia standard epinephrine. Between each of the series of procaine:epinephrine mixtures, a series of injections of the standard were repeated. The quantity calculated to produce a thirty-millimeter rise in this standard series is given on the following line of the table. For example, in Chart No. 169, it was found that twenty micrograms of standard epinephrine were required to produce an increase of thirty millimeters in blood pressure. When a solution containing fifty parts of procaine to one part of epinephrine was injected, thirty-two micrograms were required to produce this same response. After the injection of this 50:1 series, it required thirty micrograms of standard epinephrine to produce the desired increase. This particular proportion of procaine:epinephrine decreased the pressor response to epinephrine in the same solution and in a subsequent series of injectio This depression of response was not noted in any other instance and is being urther investigated. The next injection was made with a solution containing one hundred and twenty-five parts of procaine to one part of epinephrine; twenty-two micrograms were required to produce the desired degree of response. Following this, only fifteen micrograms of standard epinephrine were needed to produce the same effect. This mixture had potentiated the action of epinephrine 20/15 or 1.33 times. In order to make direct comparisons of effects without regard to the differences in susceptibility of different dogs, ratios of potency for the series are given in Table II. It is noticed that there

TABLE II.—RATIOS OF ACTIVITY OF EPINEPHRINE BEFORE AND AFTER PROCAINE.

		Ratio of Procaine to Epinephrine Injected.							
Chart no.	Epinephrine.	50.	100.	125.	250.	375.	500.	750.	1000.
169	1.0	0.67	—	1.0	1.67	1.33	1.33	—	—
		0.67	—	1.33	1.0	1.25	1.25	—	—
170	1.0	—	1.0	—	1.5	—	2.0	2.0	2.0
		—	1.33	—	1.75	—	2.0	2.0	2.0
171	1.0	—	—	—	—	—	1.0	—	—
		—	—	—	—	—	1.0	—	—

is a tendency for an increase in ratio with increase in the quantity of procaine in the mixture. The absolute value for the increase differs in different animals but tends to approach two.

In Chart No. 171, results are recorded with the 500:1 mixture alone. Here it is evident that the same degree of response is produced, in other words the presence of procaine did not affect the pressor response of a simultaneous or a subsequent injection of epinephrine. This series differed from the others in that a smaller number of injections were made, and accordingly the test animals received a smaller total quantity of procaine.

In a further series of experiments, it was found that the potentiating effect of procaine tended to disappear after about an hour. This is receiving further consideration.

A number of commercial procaine-epinephrine tablets, containing five hundred parts of procaine to one part of epinephrine, were assayed. Within the limits of experimental error the results agreed with the quantities known to be present. It is considered advisable to give a series of preliminary injections of standard epi-

nephrine. A series of injections of procaine:epinephrine mixture are then injected and the results compared.

Procaine is aminobenzoyl-diethyl-amino-ethanol. A similar potentiation of pressor action of epinephrine has been obtained with phenylpropanolamine (2), with cocaine (methyl-benzoyl-ecgonine) (3) and with a number of other local anæsthetics of unrelated chemical structure (3). No particular chemical nucleus has been found essential in producing this pressor potentiation.

CONCLUSIONS.

1. By comparing the increases in blood pressure produced by a series of injections of procaine-epinephrine mixture with those produced by a previous series of injections of standard epinephrine it is possible to assay these mixtures by the method outlined in U. S. Pharmacopœia X for epinephrine. The results fall within the limits of experimental error.

2. A number of successive injections of solutions containing between one hundred parts and one thousand parts of procaine to one part of epinephrine potentiate the pressor response of epinephrine in the same solution and in standard epinephrine injected within a period of one hour. After that time the potentiating action seems to disappear.

BIBLIOGRAPHY.

(1) Cary Eggleston and Robert A. Hatcher, "A Further Contribution to the Pharmacology of the Local Anesthetics," *J. Pharmacol. Exper. Therap.*, 13 (1919), 433–487.

(2) James C. Munch and Walter H. Hartung, "Amino Alcohols. 3.—The Potentiation of the Pressor Action of Epinephrine by Arylpropanolamines," JOUR. A. PH. A., 19 (1930), 356.

(3) Torald Sollmann, "A Manual of Pharmacology," 3rd Edition (1927), 329.

(4) M. L. Tainter, Personal communication.

AMINO ALCOHOLS. 3.—THE POTENTIATION OF THE PRESSOR ACTION OF EPINEPHRINE BY ARYLPROPANOLAMINES.*

BY JAMES C. MUNCH AND WALTER H. HARTUNG.

The bioassay of ephedrine has been complicated by the findings (1, 5 and 6) that successive intravenous injections of the same quantity to dogs or cats give progressively smaller rises in blood pressure. To determine the pressor activity of ephedrine and its related homologues, Chen used the method first developed by Elliott (3) for the assay of epinephrine. Decerebrate cats are injected intravenously with varying doses of a standard solution of epinephrine, after which a single injection of ephedrine or related drug is given intravenously. The increase in blood pressure produced by this single injection is compared with the rises in the epinephrine series and the relative potency determined.

In the authors' investigations of amino alcohols (4) of the ephedrine and epinephrine type, we were interested in determining the effect of a single dose of ephedrine and its homologues upon the subsequent pressor effects of epinephrine itself. Experiments were conducted upon medium-sized dogs, anæsthetized with

* Scientific Section A. PH. A., Rapid City meeting, 1929.

morphine and chloretone. The use of atropine in some instances did not appear to influence the magnitude of blood-pressure changes. The series of injections of standard epinephrine usually ranged from five to fifty micrograms (0.005 to 0.050 mg.). The relative sensitivity of the test animals was determined from the dose of epinephrine which caused an increase of approximately thirty mm. Results were plotted and the quantity of epinephrine determined which would give a rise of thirty mm.

After the series of responses to graded doses of epinephrine had been obtained, a single injection of the product under investigation was made intravenously or orally. The effect of this single injection was recorded and will be reported in another paper of this series. At various intervals of time following this injection, the original doses of epinephrine were repeated. The results obtained in the second series have also been plotted and that quantity determined which would cause an increase of thirty mm. in blood pressure.

In the assay of epinephrine outlined in U. S. Pharmacopœia X, it is stated that various doses of epinephrine are to be given a dog until a rise in blood pressure between thirty and sixty mm. is produced. The increases in blood pressure obtained in this series fell rather close to thirty mm. in most instances. Accordingly, this particular value was selected as a matter of convenience.

The results obtained in this work are consolidated in Tables I and II. Ephedrine was administered as a solution of the sulphate, while the hydrochlorides of the other products were used. The doses are given in terms of the respective salts. Intravenous injections were made into the femoral vein. When oral administration was employed, all food was withheld from the dogs for twelve hours, although they were given drinking water *ad libitum*. The calculated quantity of the salt was dissolved in about 40 cc. of distilled water and injected from a record syringe

TABLE I.—EFFECT OF AMINO ALCOHOLS ON PRESSOR ACTION OF EPINEPHRINE. INTRAVENOUS ADMINISTRATION.

Product.	Chart no.	Dose, mg./Kg.	Mg. Epinephrine to Produce 30 Mm. Rise in B. P. Before.	After.	Ratio B/A.
Phenylethanolamine No. 133	154	1.0	9	9	1.00
Diphenylethanolamine No. 130	174	2.0	42	42	1.0
Ephedrine Sulphate	117	0.14	5	23	0.2
Ephedrine Sulphate	118	0.67	23	23	1.0
Ephedrine Sulphate	150	1.0	19	7	2.75
Phenylpropanolamine No. 63	136	0.75	20	14	1.4
Phenylpropanolamine No. 63	151	1.00	14	5	2.75
Phenylpropanolamine No. 63	152	1.00	11	4	2.75
Phenylpropanolamine No. 63	111	2.25	15	4	3.75
Phenylpropanolamine No. 63	166	2.50	28	15	1.75
p-Methylphenylpropanolamine No. 79	114	1.5	32	26	1.25
p-Methylphenylpropanolamine No. 79	112	3.0	6	3	2.0
p-Hydroxyphenylpropanolamine No. 148	135a	0.2	13	10	1.3
p-Hydroxyphenylpropanolamine No. 148	139	0.5	30	19	1.5
p-Hydroxyphenylpropanolamine No. 148	142	0.75	8	4	2.0
p-Hydroxyphenylpropanolamine No. 148	135	1.0	16	8	2.0
Phenylbutanolamine No. 64	172	1.0	38	38	1.0
Phenylbutanolamine No. 64	171	1.0	30	30	1.0
Phenylpentanolamine No. 167	170	1.0	19	25	0.75

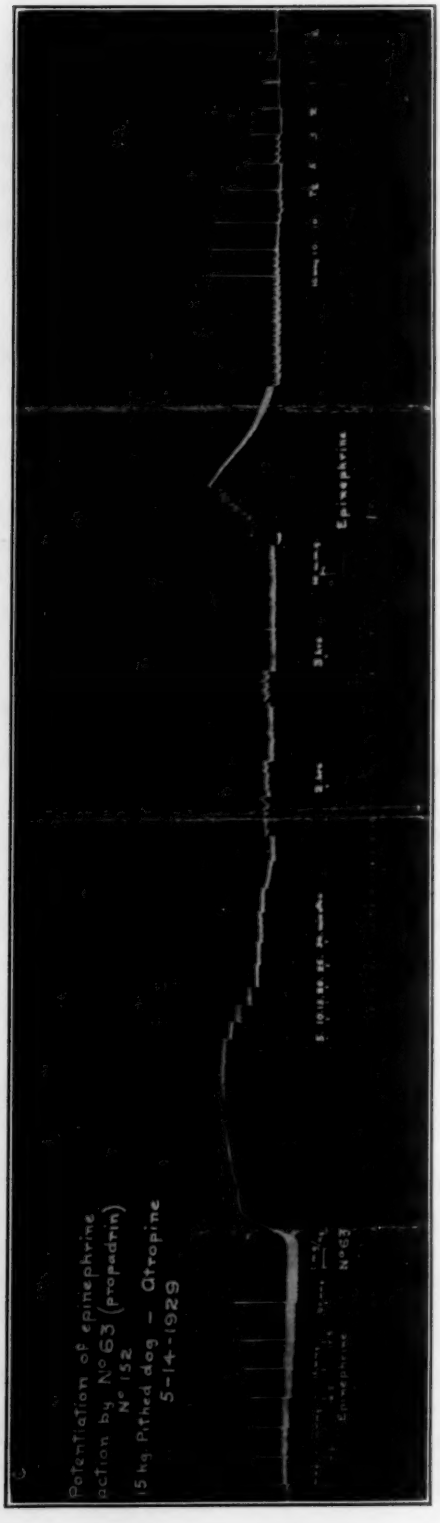


Fig. 1.—Potentiation of epinephrine action by No. 63. Pressor effect of 10 mmgm. epinephrine after intravenous injection of No. 63 is somewhat greater than the effect produced by 20 mmgm. before. Potentiation persisted in all epinephrine injections after No. 63.

through a rubber catheter which served as a stomach tube. Ten to twenty cc. of water were then used to wash the saline solution into the stomach.

The quantities of epinephrine in micrograms required to produce a rise of thirty mm. in blood pressure before and after the administration of the amino alcohols are recorded in the tables. To determine the effect of the drug upon the response to epinephrine, the quantity causing the desired effect before administration has been divided by the quantity causing the same effect after administration, and the quotient is given in the last column. A ratio of one indicates that the drug studied had no effect upon the pressor response to epinephrine; a ratio less than one that the pressor response was decreased; whereas a ratio greater than one, a potentiation of effect.

By inspection of the results of Table I, it is noted that an increase in the dose of any of these drugs intravenously causes an increase in ratio. There is a general trend of increase in potency with increase in dosage and there appears to be a stabilization at a ratio of about two. This would signify that the intravenous injection of epinephrine following that of any of the arylpropanolamines will produce a greater rise in blood pressure than will injections of the same quantity before their administration. The extent of increased action depends upon the dose employed but apparently tends to become twice as potent. Results obtained with ephedrine, phenylpropanolamine (No. 63) and its *para*-hydroxy derivative (No. 148) are in reasonable agreement.

The *para*-methyl derivative (No. 79) seemed to be somewhat less efficient in causing potentiation. No potentiation was noted following phenylethanolamine (No. 133), phenylbutanolamine (No. 64) nor diphenylethanolamine (No. 130) when given intravenously in doses of one mg. per Kg.

TABLE II.—EFFECT OF AMINO ALCOHOLS ON PRESSOR ACTION OF EPINEPHRINE. ORAL ADMINISTRATION.

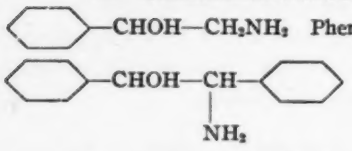
Product.	Chart no.	Dose, mg./Kg.	Mg. Epinephrine to Produce 30 Mm. Rise in B. P. Before.	After.	Ratio B/A.
Ephedrine Sulphate	127	10.0	32	37	0.9
Ephedrine Sulphate	163	12.5	40	34	1.25
No. 63	162	8.3	34	33	1.0
No. 63	161	12.5	7	13	0.67
No. 63	158	25.0	10	20	0.5
No. 63	162	25.0	11	9	1.25
No. 63	159	50.0	23	30	0.75
No. 63	168	75.0	42	42	1.0
No. 63	124	100.0	15	8	2.0
No. 63	167	100.0	32	40	0.75
No. 148	140	3.0	22	21	1.0
No. 148	141	10.0	3	3	1.0

Results of oral administration of some of these products are given in Table II. The results are more variable than those obtained with intravenous injections. It appears that potentiation of pressor action was not produced by the dose used. It is interesting to note that when quantities of phenylpropanolamine (No. 63) up to and including 75 mg. per Kg. orally failed to show any evidence of potentiation they also failed to show any definite evidence of increase in blood pressure. The injection of 100 mg. per Kg. orally causes a definite increase in the blood pressure of dogs and the results obtained suggest the possibility of some potentiation. The number of animals tested has been too small to warrant definite conclusions regarding the potentiating action of this oral dose. The conclusion seems warranted that the oral administration of these arylpropanolamines in the doses employed has not caused definite potentiation of the pressor effects of epinephrine.

After these experiments had been completed, a clinical report by Csepai and Doleschall (2) came to our attention. These authors report that the administration of ephedrine caused a subsequent injection of epinephrine to produce a greatly potentiated increase in blood pressure. The results obtained in our investigation suggest that this same potentiation may be produced by other arylpropanolamines. It has not been found following the intravenous injection of ethanol, butanol, pentanol nor diphenylethanol derivatives. It is shown by phenylpropanolamine, its *para*-methyl and *para*-hydroxy derivatives, as well as by the methylamino derivative (ephedrine).

The graphical formulae of the compounds studied are given below. From these results it is evident that the phenylpropanolamine skeleton (Group B) must be present to potentiate the action of epinephrine in this series of homologues. Substitution in the aromatic nucleus by OH or CH_3 in the *para*-position or CH_3 on the amino nitrogen does not appear to alter this potentiating action. Decreasing (Group A) or increasing (Group C) the length of the aliphatic side chain promptly eliminates this effect.

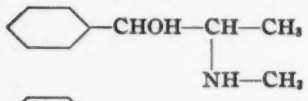
A. Ethanolamine Derivatives.



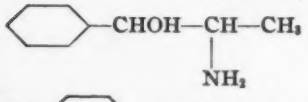
Phenylethanolamine

Diphenylethanolamine

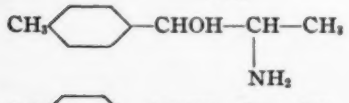
B. Propanolamine Derivatives.



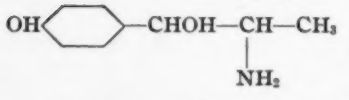
Phenylpropanolmethylamine (ephedrine)



Phenylpropanolamine

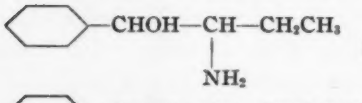


p-Methylphenylpropanolamine

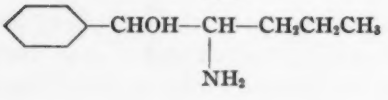


p-Hydroxyphenylpropanolamine

C. Higher Alkanolamine Derivatives.



Phenylbutanolamine



Phenylpentanolamine

CONCLUSIONS.

1. Phenylpropanolamine, its *para*-hydroxy and *para*-methyl derivatives and the methylamino derivative (ephedrine) given intravenously to dogs in doses of one to three mg. per Kg. potentiate the pressor action of epinephrine.

2. Homologous amino alcohols in which the aliphatic side chain is decreased or increased do not show this potentiation.

3. The degree of potentiation varies with the dose administered. Doses between one and three mg. per Kg. doubled the action of epinephrine.

4. Oral administration in doses which do not increase the blood pressure does not show any potentiating action.

5. Because of this potentiation, caution is necessary in the administration of epinephrine following these products.

BIBLIOGRAPHY.

(1) K. K. Chen, Chang-Keng Wu and Erle Henriksen, "Relationship between the Pharmacological Action and the Chemical Constitution and Configuration of the Optical Isomers of Ephedrine and Related Compounds," *J. Pharmacol.*, 36 (1929), 363–400.

(2) Karl Csepai and F. Doleschall, "Über eine bisher unbekannte wirkung des ephedrins," *Arch. exptl. Path. Pharmakol.*, 134 (1928), 109–112.

(3) T. R. Elliott, "The Control of the Suprarenal Glands by the Splanchnic Nerves," *J. Physiology*, 44 (1912), 374–409.

(4) Walter H. Hartung and James C. Munch, "Amino Alcohols. I. Phenylpropanolamine and Para-Tolylpropanolamine," *J. A. C. S.*, 51 (1929), 2262–2266.

(5) Paul S. Pittenger, "The Actions and Biologic Assay of Ephedrine," JOUR. A. PH. A., 17 (1928), 634–640.

(6) L. W. Rowe, "The Comparative Pharmacological Action of Ephedrine and Adrenalin," JOUR. A. PH. A., 16 (1927), 912–918.

THE BELLIER TEST FOR SESAME OIL.*

BY E. FULLERTON COOK.

Is the Bellier test infallable, is it absolutely distinctive for Sesame Oil, how small a percentage of sesame oil in other oils will it detect, what conditions interfere with its application, can the principle responsible for the Bellier reaction be removed and can the original test be improved?

These are some of the obvious questions presenting themselves in the undertaking of this investigation.

Sesame oil is of much greater importance in Europe than in the United States as sesame seed is largely cultivated there, and the oil which it supplies is a valuable food and technical product while cotton seed oil and corn oil of the United States are practically unknown in Europe, except as a museum curiosity. Furthermore, the food laws in some European countries require the presence of a small percentage of sesame oil in all "Oleomargarine" as a ready means of identification, hence distinctive tests are of importance.

The Bellier reaction was first noted in the literature in 1899[1] and is now one of the several tests commonly used to identify or detect the presence of sesame oil.

The usual directions for the test are:

Over 1 volume (about 1 cc.) of colorless nitric acid (sp. gr. 1.4), in a test-tube, carefully overlay 1 volume of the oil to be tested, then add 1 volume of benzol, containing 1.5 per cent of resorcinol and shake once. The acid strata should become intensely green if sesame oil is present (which is the characteristic feature of the test) and the benzol-oil strata becomes violet. These colors quickly fade to dark red.

Considerable difficulty was experienced when using this technique in always obtaining the distinctive green color even when using the same acid and oil and, with even the most exact following of the technique, the test was at times uncertain in its results.

For this reason modifications were studied and the following is recommended as more simple, far more reliable and more sensitive.

MODIFIED BELLIER TEST (COOK).

Add 2 drops of the oil to 1 cc. of colorless nitric acid (sp. gr. 1.4) in a test-tube, agitate slightly, then add a small crystal of resorcin and again agitate. If sesame oil is present a green color should develop about the oil and extend into the acid. On adding benzol or chloroform practically all of the green color remains in the acid strata but fades within 3 to 5 minutes.

* Scientific Section, A. PH. A., Rapid City meeting, 1929.

[1] Experimental tests made in the Pharmaceutical Institute, University of Berne, Berne, Switzerland, under the direction of Prof. Alexander Tschirch.

Ann. chim. anal. appl., 4 (1899), 217–220; *Jahresb. Chem.* (1899), 1176; *Chem.-Ztg.* (1899), 263.

NOTE: If the crystal of resorcinol is too large the brown color resulting from the action of HNO_3 on resorcinol will obscure the green color. Therefore, use a small crystal.

SENSITIVENESS OF MODIFIED BELLIER TEST (COOK).

After many experiments it was found that a 0.4 per cent (1 in 250) solution of sesame oil in peanut oil was the smallest amount which could be definitely detected by this modified test. It was also found that the Furfurol (Bandoninsche) Test would detect 5 per cent (1 in 20) of sesame oil in solution with peanut oil but no less.

DISTINCTIVE CHARACTER OF THE BELLIER TEST.

A number of commercial samples of seed oils were bought and tested for their response to the Bellier test and subsequently these same kinds of oils and some others were prepared by extraction and also tested by the Bellier reaction. All reactions were observed and the characteristics noted immediately and then after 10, 20, 30 and 60 seconds, and also after 2 and 5 minutes.

These details are not given as they contributed little to the study here reported.

RESULTS OF APPLYING THE ORIGINAL BELLIER TEST TO SEED OILS.

Arachis (Peanut) Oil		No. 1	(8 tests)	Negative
		No. 2	(3 tests)	Negative
	Extracted	No. 15E	(1 test)	Negative
	Extracted	No. 16E	(1 test)	Negative
Linseed Oil		No. 1	(2 tests)	Negative
		No. 3	(2 tests)	Negative
	Extracted	No. 2E	(2 tests)	Negative
	Extracted	No. 10E	(2 tests)	Negative
Castor Oil		No. 1	(2 tests)	Negative
		No. 3	(2 tests)	Negative
	Extracted	No. 3E	(2 tests)	Negative
	Extracted	No. 4E	(1 test)	Negative
	Extracted	No. 5E	(1 test)	Negative
	Extracted	No. 6E	(1 test)	Negative
Olive Oil		No. 1	(2 tests)	Negative
		No. 2	(2 tests)	Negative
		No. 3	(2 tests)	Negative
Rape Oil		No. 1	(2 tests)	Negative
		No. 2	(2 tests)	Negative
	Extracted	No. 1E	(2 tests)	Negative
	Extracted	No. 9E	(2 tests)	Negative
Almond Oil		No. 1	(2 tests)	Negative
		No. 2	(2 tests)	Negative
	Extracted	No. 11E	(2 tests)	Negative
	Extracted	No. 12E	(2 tests)	Negative
Peach Kernel Oil		No. 1	(2 tests)	Negative
Cotton Seed Oil		No. 1	(2 tests)	Negative
		No. 2	(2 tests)	Negative

Oil of Theobroma.—No green color in response to the modified Bellier (Cook) test.
Walnut Kernel Oil.—No green color in response to the modified Bellier (Cook) test.

These tests were followed by the application of the "Modified Bellier (Cook) test" with a negative response by all oils but Sesame which invariably responded to the test (Note: The "No. 1 Sesame Oil," bought commercially, never responded to this test and was shown not to be sesame oil).

SESAME OILS.

Test No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No. of Sesame Oil	1	2	2	2	2	2	3	3	3	4	4	13E*	13E	14E	14E
Vol. HNO_3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Vol. Sesame Oil	1	1	1/4	1	1/4	2	1	1	1/4	1	1	1	1	1	1
Resorcin-Benzol Vol. solution 1.5%	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
With little shaking		√	√				√		√	√		√		√	
With vigorous shaking	√			√	√	√		√			√		√		√
Result—no green color	+	+	+			+	+			+		+		+	+
No green color	−	−		−	−			−	−		−		−		

* "E" indicates that the sample was obtained by extraction from the seed.

Can the Principle Responsible for the Green Color of the Bellier Test for Sesame Oil Be Removed?—The oil was subjected to many tests involving extraction, carbonization, saponification or enzymatic action and the only method found successful in removing the principle, causing the green color of the Bellier test, was repeated washing with glacial acetic acid, at least 10 washings being necessary to complete the extraction.

Negative Result from the Following Treatments.—Extractions were made with water, with 50, 60, 70 and 80 per cent alcohol, with 5, 10, 20 and 30 per cent hydrochloric acid, with 20 per cent sulphuric acid, with acetone, acetic ether, a mixture of acetone 4-alcohol 1, a mixture of equal volumes acetic ether and alcohol, a mixture of acetone 2-water 3, a mixture of acetone 4-water 1, a mixture of ether 1-water 2, a mixture of chloroform 1-water 2, a mixture of petroleum ether 1-water 2.

After all of these attempted extractions the separated sesame oil responded without change to the test.

The addition of 3 drops of 96% sulphuric acid to 10 cc. of sesame oil and subsequent heating to 150° C. did not lessen the response of the oil to the test.

On heating sesame oil and water, at boiling temperature for two hours and separating the oil it still responded to the test.

On treating sesame oil to the action of lipase (from a 10% emulsion of castor oil beans) at about 35° C., for 3 days, with frequent agitation, and then allowing to stand, the upper strata was much thickened and filled with crystalline masses of fatty acid. This crystalline mass and the separated oil still responded to the modified Bellier (Cook) test.

On heating 50 Gm. of sesame oil to exactly 250° C., withdrawing a sample and cooling immediately the Bellier test was normal. On continuing the 250° C. on the remainder of the oil for 30 minutes, the oil still responded normally to the Bellier test.

On treating the sesame oil with hot 50% sulphuric acid and also after passing live steam through the mixture, without pressure, for several hours the separated oil responded to the modified Bellier reaction without change.

On completely saponifying sesame oil with KOH in 70% alcohol, the resulting

soap responded to the modified test although the green color was slightly tinged with brown.

On decomposing the soap just described by the addition of hydrochloric acid, the separated fatty acids still responded to the test.

On shaking 50 Gm. of sesame oil with 5 Gm. of kieselguhr and filtering, the separated oil was positive to the Bellier test.

On treating sesame oil with Lloyd's reagent (freshly hydrated aluminum silicate) and filtering, the oil is still positive to the Bellier test.

On extracting the hulls of sesame seed with petroleum ether, the resulting extract was negative in its reaction to the modified Bellier (Cook) test.

Positive Result from Extraction of Sesame Oil.—On shaking out 100 cc. of sesame oil, not less than ten times, with 40 cc. of glacial acetic acid, the oil, thus extracted, no longer responded to the modified Bellier (Cook) test.

The principle causing the green color of the Bellier reaction in sesame oil is not sesamin. Villavechia and Fabris[1] gave a method for extracting a crystalline principle, which they called Sesamin, from sesame oil.

Their process was as follows:

> Saponify the sesame oil with alcoholic KOH, evaporate the alcohol, dissolve the dried soap in water, warm the solution and precipitate with an excess of barium chloride. (This barium soap gave the green color to the modified Bellier test but the KCl solution did not.)
>
> The barium soap is then dried, digested with boiling alcohol and the alcohol solution separated and evaporated. Crystals of sesamin separate which, according to V. and F., give no color reactions.

This was verified by the author.

Malagnini and Armauni[2] also reported a method for extracting a white crystalline body which they claim gives intense color reactions.

They reported the extraction of sesame oil with a mixture of petroleum ether 30 parts—alcohol 70 parts and the obtaining of a white crystalline body which gave intense color reactions.

In attempting to carry out this process it was evident that the mixture dissolved a portion of the oil and both strata gave an intense green to the modified test.

The petroleum-ether-alcohol strata was still further shaken out with petroleum ether to remove dissolved oil and again separated. Both strata still give the Bellier reaction the alcoholic one, apparently most intensively.

On evaporating the alcohol strata it yielded a few drops of oil and a minute amount of a seemingly crystalline substance.

This oil and crystalline mixture was washed with petroleum ether to remove oil. The washings gave the Bellier reaction but no satisfactory crystalline principle was obtained.

Extraction with Glacial Acetic Acid.—Having observed that repeated washing (not less than 10) with glacial acetic acid removed from sesame oil the principle responsible for the green color of the Bellier test, an effort was made to separate this principle from the Acetic Acid extract as follows:

The combined acetic acid washings were shaken out with ether and the combined ether extracts were evaporated spontaneously. The resulting residue con-

[1] *Jahresbericht d. Pharm., abst.* (1897), 708.

[2] *Jahresbericht d. Pharm.* (1907), 439.

sisted of an upper oily layer and a lower brown-colored strata which was strongly acid.

This residue was then treated with petroleum ether to separate the oil and the oil was discarded.

The remaining brown-acid extract was again taken up with ether and the solution evaporated spontaneously. The residue consisted of a brown, crystalline mass. This residue was then dissolved in 95% alcohol (it was not entirely soluble or at least not all readily soluble) and filtered. This alcoholic solution, on evaporation, left a residue containing small white crystals in the center and a brown resin-like mass on the outer edge. The brown resin-like residue gave the Bellier reaction strongly.

The crystalline mass was again dissolved in ether (the crystals were hard and dissolved slowly) and allowed to evaporate spontaneously. The resulting crystals were almost colorless, well-formed, rhombic and corresponding in most physical factors with the reported characteristics of sesamin. These crystals did not give a color reaction to the Bellier test and the assumption is that the principle causing this color reaction will be found in the resin-like mass referred to above.

No further effort has been made to isolate it.

The following table shows the various physical factors determined for the crystalline substance extracted from sesame oil.

PHYSICAL FACTORS FOR SESAMIN.

Melting point.	Crystals obtained by glacial acetic acid extraction 121 to 122° C.	Sesamin as reported by Villavechia and Fabris—Jahresbericht d. Pharm. (1897), 708. 123° C.
Soluble (leaving crystals on evaporation)	Alcohol (95%); absolute alcohol; ether (slowly); benzol (readily)	Alcohol (colorless needles); chloroform (prismatic crystals)
Soluble (leaving amorphous residue on evaporation)	Acetone (readily); acetic ether; chloroform (readily); glacial acetic acid	Benzol; glacial acetic acid
Insoluble	Cold and hot water; petroleum ether	Ether, water, petroleum ether
HNO_3 (1.4)	Green color	No color reactions
Furfurol test. (Bandoninche reaction)	Negative	
HNO_3-Resorcin-cryst. reaction	Negative	

CONCLUSIONS.

The answers so far determined for the several questions propounded at the beginning of the paper are:

1. The modified Bellier (Cook) Test is invariable in its response on all sesame oils examined. The original Bellier test is uncertain.

2. This test is distinctive for sesame oil so far as oils for the test were available and this included all common fixed oils.

3. The modified test will detect 1 part of sesame oil in 250 parts of a dilution in another fixed oil.

4. Too much crystal resorcinol in the modified test and too vigorous or prolonged shaking in the original test interfere with the development of the green color.

5. So far as experiments were conducted they indicate that sesame oil can

only, with much expense and labor, be freed from the principle which causes this distinctive color reaction.

6. The modified test, as suggested by the author, is believed to be a distinct improvement over the original test, giving more assured results and a more sensitive test.

ADDITIONAL REFERENCES.

Chem.-Ztg. (1899), 263.

Jahresbericht Pharm. (1903), 525; (1906), 450; (1907), 439–440; (1908), 398–400; (1909), 475–476; (1910), 421; (1911), 367; (1912), 428; (1913), 364, 385, 390; (1918), 303; (1919), 327 and 959; (1921), 316 and 327; and (1922), 299.

Jahresbericht Chem. (1899), 1175, 1176, 1179, 1180; (1900), 749 and 750; (1901), 782, 783, 791, 792; (1902), 955; (1903), 934; (1904), 1073; (1905–1908), II, 572, 581, 582, 662; (1909), 235, 242 and 244; (1910), 248, 257, 259.

THE ACID-BASE EQUILIBRIUM OF TINCTURE OF DIGITALIS.*

BY JOHN C. KRANTZ, JR.

INTRODUCTION.

Recently a considerable amount of investigation has been carried out to study the effect of changes in hydrogen-ion concentration upon the stability of the various preparations of digitalis. Tainter (1) showed that the physiological activity of freshly prepared infusions of digitalis is independent of their hydrogen-ion concentrations, and that the infusion tended to become acid upon standing. This investigator determined the acidity of the tincture to be the equivalent of an $N/10{,}000$ hydrochloric acid solution, approximately p_H 4.6. Takahashi (2) contrary to the results of Tainter showed that the addition of 0.05 per cent to 0.1 per cent of hydrochloric acid to the infusion of digitalis increases the stability of the infusion as determined by the frog method.

Smith (3) in his studies of the determination of the hydrogen-ion concentration in alcoholic solutions investigated tincture of digitalis and found the range of p_H to be between 5.12 and 5.77. Of special interest, is the work of Joachimaglu and Bose (4) who showed the stability of tincture of digitalis to be increased by the addition of 0.1 or 0.2 per cent of tartaric acid. These investigators found the p_H of tincture of digitalis to be 5.88, with 0.1 per cent tartaric acid 5.44 and with 0.2 per cent of the acid 5.13.

With the thought of studying the influence of buffer-salt mixtures in the menstruum upon the stability of the tincture, this investigation was begun.

Buffering the Menstruum of Tincture of Digitalis.—A series of menstrua were prepared using an 80% alcohol and the citrate mixtures described by Sorensen (5). With these a series of tinctures were prepared by the U. S. P. method omitting the extraction of the drug with petroleum ether. The hydrogen-ion concentrations of the menstrua were determined by means of the hydrogen electrode (Wilson type (6)). The values obtained were reproducible within 0.1 unit p_H.

Table I indicates the composition of the buffer mixtures, the p_H of the menstruum and the p_H of the tincture.

---

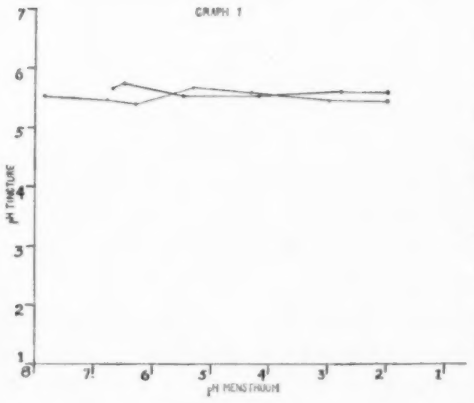
* Scientific Section A. PH. A., Rapid City meeting, 1929.

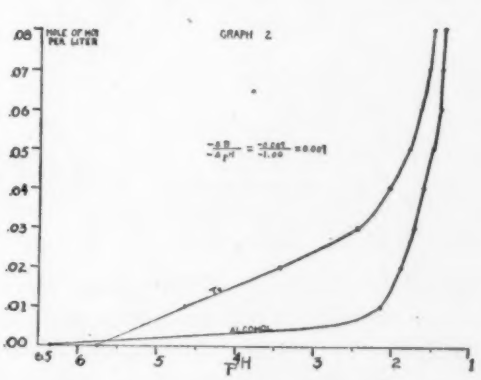
TABLE I.

Number.	Composition of menstruum.	p_H menstruum.	p_H tincture.
1	480 cc. alcohol—120 cc. 0.1 *N.* HCl	2.09	5.46
2	480 cc. alcohol—36 cc. secondary citrate 0.1 *M.*—84 cc. 0.1 *N.* HCl	2.97	5.47
3	480 cc. alcohol—48 cc. secondary citrate 0.1 *M.*—72 cc. 0.1 *N.* HCl	4.30	5.58
4	480 cc. alcohol—66 cc. secondary citrate 0.1 *M.*—54 cc. 0.1 *N.* HCl	5.30	5.61
5*	480 cc. alcohol—27 cc. secondary citrate 0.1 *M.*—3 cc. 0.1 *N.* HCl and 90 cc. distilled water	6.27	5.40
6*	480 cc. alcohol—30 cc. secondary citrate 0.1 *M.* and 90 cc. distilled water	6.71	5.45
7*	480 cc. alcohol—15 cc. secondary citrate 0.1 *M.*—15 cc. 0.1 *N.* NaOH and 90 cc. distilled water	7.75	5.52
8	480 cc. alcohol—120 cc. distilled water—unbuffered control	5.45	5.55

* Nos. 5, 6 and 7 were diluted with water to avoid precipitation of the buffer salts by the alcohol. In other cases this dilution was unnecessary.

The results recorded in Table I indicate that using the buffered menstrua described the extractive material of the digitalis leaves possessed sufficiently buffer





capacity to bring each of the finished tinctures to practically the same hydrogen-ion concentration, *i. e.*, close to the p_H of the unbuffered tincture.

Another sample of digitalis assaying the U. S. P. strength by the one-hour frog method was percolated and prepared into several samples of tinctures. The hydrogen-ion concentrations, the menstrua and tinctures of the second sample of digitalis are shown in Table II.

TABLE II.

No.	p_H menstruum.	p_H tincture.	No.	p_H menstruum.	p_H tincture.
1	1.97	5.63	5	6.44	5.72
2	2.75	5.62	6	6.65	5.57
3	4.17	5.54	7	5.55 control	5.52
4	5.42	5.54			

When the results of these determinations are plotted, using the p_H of the menstruum as abscissæ and the p_H of the tinctures as ordinates, the interesting hydrogen-ion neutralization properties of digitalis is observed.

Buffer Capacity of Tincture Digitalis.—Having observed the power of the extractive matter in the digitalis leaves to absorb acid indicating that only strong acids

in relative high concentrations are capable of changing the hydrogen-ion concentration of the tincture, the next step was to determine the buffer capacity of the tincture, quantitatively. The differential ratio of Van Slyke (7) $\frac{dB}{dp_H}$ used by the author (8) in measuring the buffer capacity of acacia solutions was used as a standard for measurement. This ratio expresses the relationship between the increment in gram equivalents of strong base added to the buffer solution and the resultant increment in p_H. If an acid is added the value of each term in the expression is negative, hence the ratio, the Van Slyke "β," has always a positive value.

A sample of tincture of digitalis was prepared and divided into nine portions. To each of these samples a definite gram equivalent of hydrochloric acid was added, and the p_H was determined. This procedure was also employed in case of the pure menstruum. Table III records the results of these measurements and shows definitely the acid-absorbing capacity of tincture of digitalis.

TABLE III.

No.	Cc. 0.1 *N.* HCl per l.	Mole HCl per l.	p_H tincture, 3 hrs.	p_H tincture, 3 days.	p_H menstruum.
1	00	00	5.75	5.73	6.35
2	100	0.01	4.61	4.55	2.18
3	200	0.02	3.57	3.47	1.89
4	300	0.03	2.43	2.36	1.71
5	400	0.04	2.04	2.04	1.60
6	500	0.05	1.74	1.85	1.49
7	600	0.06	1.62	1.76	1.39
8	700	0.07	1.51	1.67	1.36
9	800	0.08	1.45	1.57	1.33

Table III shows the difference between the hydrogen-ion concentration of the menstrua and that of the tincture of digitalis upon the addition of various quantities of hydrochloric acid. The values obtained after three days' standing were for the most part identical with those obtained soon after the addition of the acid. In Graph 2 this relationship is more clearly shown when the quantities of acid added are plotted as ordinates and the corresponding increments in p_H as abscissæ. From this graph we may obtain the ratio $\frac{-\Delta B}{-\Delta p_H}$ where each of these values is a measurable increment. Thus to change the p_H of a liter of tincture of digitalis from p_H 5.75 to p_H 4.75 approximately 0.009 mole of hydrochloric acid must be added or 90 cc. of 0.1*N.* acid. Then

$$\frac{-\Delta B}{-\Delta p_H} = \frac{-0.009}{-1.00} = 0.009$$

In order to obtain the value "β" the differential ratio, a tangent is drawn to the curve at a definite point, values on the ordinate axis above and below this point are taken and the base line intercepts of the tangent at these points are determined. Between the values p_H 5.75 and p_H 2.5 the curve is a straight line so that the buffer value obtained using the measurable increments is identical with that of the differential ratio $\frac{-dB}{-dp_H} = \beta$, where β equals 0.009 between p_H 5.75 and 2.5. It should be observed that the addition of 0.01 mole hydrochloric acid per liter of the menstruum changed the p_H from 6.35 to 2.2. As Joachimaglu (4) had shown the pres-

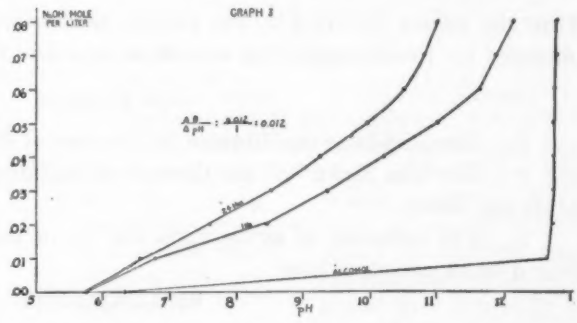
ence of sodium bicarbonate to be detrimental to the stability of the tincture, and further considering the buffer effect of this drug on acids it was thought interesting to study the influence of the addition of alkali upon the p_H of the tincture.

The procedure followed in this portion of the experiment was the same as that employed in the preceding work. Table IV records these results.

TABLE IV.

No.	Cc. 0.1 *N.* NaOH per l.	Mole NaOH per l.	p_H tincture after 1 hr.	p_H tincture after 24 hrs.	p_H of menstruum.
1	00	00	5.75	5.75	6.35
2	100	0.01	6.83	6.55	12.66
3	200	0.02	8.45	7.60	12.78
4	300	0.03	9.34	8.52	12.79
5	400	0.04	10.20	9.25	12.74
6	500	0.05	11.03	9.97	12.76
7	600	0.06	11.68	10.51	12.77
8	700	0.07	11.87	10.83	12.80
9	800	0.08	12.12	11.00	12.78

Plotting these values as before in Graph 3 we observe the relationship between the action of strongly dissociated alkali upon the tincture of digitalis and its menstruum. After equilibrium is established, it will be observed that the curve to p_H 9.5 is a straight line, hence the buffer capacity of the tincture by direct reading from the curve up to this point.



To change the p_H from 5.75 to 6.75 required the addition of 0.012 mole of sodium hydroxide per liter or

$$\frac{\Delta B}{\Delta p_H} = \frac{0.012}{1} = 0.012$$

Likewise "β" will have the same value.

Nature of the Buffer Material.—In order to determine whether the buffer substance in this tincture was inorganic or organic in nature, the following experiment was performed. Twenty cc. of the tincture was evaporated to dryness and ashed. The ash was dissolved in 20 cc. of 80 per cent alcohol, p_H 6.35—the p_H of the solution was 10.64. Upon the addition of 2 cc. 0.1*N.* hydrochloric acid the p_H of this solution changed to 2.52, upon the addition of 2 cc. 0.1*N.* sodium hydroxide to the original solution the p_H of the solution became 12.82. The amount of acid or alkali added was identical with that added to the tincture in the foregoing experiment, where it will be recalled that it required about 100 cc. per liter or 2 cc. of strong acid or base per 20 cc. to change the p_H of the tincture one unit.

This seems to indicate that buffer influence of the tincture is dependent upon the organic extractive material from the drug.

Effect of Aging upon the p_H of Tincture of Digitalis.—Joachimaglu found that a tincture of digitalis with a p_H of 5.88 changed upon standing at room temperature as follows:

p_H when prepared.	p_H after one year.	p_H after two years.
5.88	5.66	5.38

The author observed a more rapid change of p_H in certain tinctures of digitalis when stored in direct light. The direction of the change was the same as that observed by the previous investigator.

A sample prepared by the U. S. P. method was kept in a flint-glass bottle in direct light in an incompletely filled bottle at room temperature.

p_H when prepared.	p_H after $3^1/_2$ months.
5.67	5.45

Other samples of tincture stored in flint bottles in a closed closet at room temperature showed no significant change in hydrogen-ion concentration over a period of a year.

Several different samples of tincture of digitalis were studied and the following p_H values obtained immediately after preparation.

No. 1—5.88	No. 4—5.67	No. 7—5.61
No. 2—5.67	No. 5—5.68	Average 5.71
No. 3—5.70	No. 6—5.73	

Thus the values obtained by the present author are in close agreement with those obtained by Joachimaglu, but somewhat less acid than those obtained by Tainter.

CONCLUSIONS.

1. The acid-base equilibrium of tincture of digitalis has been studied.

2. The Van Slyke "β" for tincture of digitalis has been determined for strong acids and bases.

3. The influence of aging upon the p_H of the tincture has been determined over a short period of time.

BIBLIOGRAPHY.

(1) M. L. Tainter, JOUR. A. PH. A., 15 (1926), 255.
(2) H. Takahashi, *J. Tohoku Exptl. Med.*, 19 (1927), 491.
(3) R. B. Smith, JOUR. A. PH. A., 17 (1928), 241.
(4) J. Joachimaglu and P. Bose, *Arch. exptl. Path. Pharmakol.*, Bd. 102 (1924), 17.
(5) "Determination Hydrogen-Ions," M. Clark, page 82, Williams and Wilkins, Baltimore, Maryland.
(6) Wilson, *Ind. Eng. Chem.*, 17 (1925), 74.
(7) D. D. Van Slyke, *J. Biol. Chem.*, 53 (1922), 528.
(8) J. C. Krantz, Jr., *Ibid.*, 18 (1929), 469.

PHARMACEUTICAL RESEARCH LABORATORY,
SHARP & DOHME,
BALTIMORE, MARYLAND.

ABSTRACT OF DISCUSSION.

E. E. Swanson inquired whether Dr. Krantz had tested any of the tinctures for p_H along with the determination of potency.

The author stated that he had attempted to prepare tinctures of different p_H but as these showed about the same p_H this study was abandoned. Dr. Munch had made the physiological tests.

James C. Munch said he had made several of the physiological examinations but was not in position to say which of them, at this time was most potent. He considered that nature had done good work in protecting digitalis and suggested that the change in hydrogen-ion concentration would not be helpful.

SUGGESTIONS RELATIVE TO U. S. P. X REVISION.*

BY JULES BEBIE.

Revision of U. S. P. X is now under consideration and the Chairman of the Revision Committee has extended an invitation to submit suggestions for changes of the present official formulas, tests and assays.

In the course of our work in the manufacture and testing of pharmaceutical chemicals we have come across some U. S. P. tests and specifications which in our opinion are open for improvement and it is the purpose of this paper to bring these cases to your attention.

1. ETHER SOLUBILITIES.

Literature references as well as our own observations differ more or less from the ether solubilities as given for several products in U. S. P. X. It is not stated there what kind of ether should be used for the determination. However, whenever reagents are required which are official in U. S. P., it is customary to use the U. S. P. quality as reagent. We have therefore been using U. S. P. X ether as well as U. S. P. procedure for determination of solubility in ether. Probably some of the published data on ether solubilities have been obtained by the use of absolute ether, free of moisture and alcohol, and this may account for some of the big differences.

These terms signify the numerical ranges given on page 458 of U. S. P. X.

TABLE I.—ETHER SOLUBILITIES OF U. S. P. X PRODUCTS.

Product.	U. S. P. X specification.	Solubility determinations by U. S. P. method.	Literature references.
Acetanilid	1 Gm. is soluble in 17 cc. ether at 25°	1 Gm. soluble in 18.3 cc. U. S. P. X ether. (Average of 3 determinations) 1 Gm. soluble in 53.1 cc. of absolute ether. (Average of 3 determinations)	Seidel 2nd Ed., Vol. I, p. 3, 2.8 Gm. per 100 Gm. saturated solution, or 1 Gm. in 49 cc. at 25° (Marden & Dover, *J. Am. Ch. Soc.*, 38 (1916), p. 1242) in ether distilled over sodium. Ph. Germ. VI. Soluble in 50 parts of ether (by weight), equiv. 1 Gm. in 70 cc.
Acetphenetidin	1 Gm. is soluble in about 130 cc. of ether at 25°	1 Gm. soluble in 148 cc. U. S. P. X ether, or in 306 cc. absolute ether	Seidel, 2nd Ed., Vol. I, p. 477, 1.56 Gm. per 100 Gm. saturated solution, or 1 Gm. in 89 cc. ether. Taylor and Bebie, *Am. J. Pharm.*, 1924, p. 597, 0.32 Gm. in 100 cc. absolute ether, or 1 Gm. in 310 cc. Taylor: 1 Gm. in 102 cc. U. S. P. ether. Bebie: 1 Gm. in 156 cc. U. S. P. ether. Average 1 Gm. in 129 cc. U. S. P. ether
Acetylsalicylic Acid	1 Gm. is soluble in 10–15 cc. of ether	1 Gm. soluble in 15 cc. of ether	Ph. Germ. VI, Soluble in 20 parts of ether (by weight), equiv. 1 Gm. in 28 cc.
Phenolphthalein	1 Gm. is soluble in about 70 cc. of ether	1 Gm. soluble in 105 cc. U. S. P. X ether. (Average of 4 determinations)	

* Scientific Section, A. PH. A., Rapid City meeting, 1929.

It should be specified in the Pharmacopœia what kind of ether is to be used for the solubility determinations.

The results are tabulated in Table I. It clearly shows the existing discrepancies and it is recommended that this should be investigated for the revision of U. S. P. X.

On account of slight variations in the composition of ether in regard to alcohol and water content, it is difficult to get checking results on some of the ether solubilities, when the determinations are made in different laboratories.

For this reason it would perhaps be advisable to eliminate exact ether solubility figures and to simply state that a substance is "freely," "sparingly," etc., soluble in ether.

OTHER SOLUBILITIES.

The solubility of Gluside (Saccharin) is given as 1 Gm. soluble in 290 cc. of water at 25° and in about 25 cc. of boiling water. It is proposed to change these figures to 1:325 at 25° and 1:30 for boiling water.

LITERATURE REFERENCES.

British Pharmacopœia: Soluble in 400 parts of water at 25°.

Japanese Pharmacopœia IV: Soluble in about 400 parts of water and in 30 parts of boiling water.

French Pharmacopœia 1927: Soluble in 400 parts of water at 15° and 30 parts of boiling water.

Nederlandsche Pharmacopœia: 1 Gm. in 360 parts of water at 15°.

Sodium Salicylate is stated to be soluble 1 Gm. in 9.2 cc. alcohol (94.9% by vol.) at 25°. We find it is soluble in 9.3 Gm. of alcohol or 10.2 cc.

LITERATURE REFERENCE.

Seidell, 2nd. Ed., p. 665, 12 Gm. per 100 Gm. saturated solution, using alcohol of 92.3% by weight = 94.9% by volume, equiv. to 1 Gm. in *10 cc.* alcohol. See also Seidell, *J. Am. Chem. Soc.*, 31 (1909), 1164.

It is recommended to change the pharmacopoeia requirements to: "One Gm. of sodium salicylate is soluble in 10.2 cc. alcohol at 25°."

TABLE II.

Product.	U. S. P. X specifications.	Melting points found in domestic and foreign samples.	Suggested change for U. S. P. XI.
Acetanilide	Melts between 113° and 115° C.	*1.* 114.4–114.8 *2.* 114.9–115.4 *3.* 114.6–115.0 Ph.F., 114, 1927	Melts between 114° and 115° C.
Gluside (Saccharin)	Melting point not below 220° C.	227.4–228.2; 227.1–227.9; 227.1–228.1; 224.7–225.6.	Melting point not below 225° C.
Vanillin	Melts between 80° and 82° C.	82.0–82.4; 81.7–82.2; 81.6–81.9; 81.8–82.1; 81.0–81.3; 81.7–82.1.	Melts between 81° and 83° C.
Salicylic Acid	Melts between 157° and 159° C.	158.8–159.1; 158.7–159.2; 158.5–159.1; 158.9–159.2.	Melts between 158° and 159° C.
Phenol-phthalein	Melting point not below 256° C.	261.2–261.8; 262.3–262.8.	Melting point not below 258° C.
Phenol	Congealing point: not below 39° C.	40.1; 39.7. Ph.F., 42.5.	Congealing point: not below 40° C.

Phenyl salicylate (Salol) is stated to be soluble, 1 Gm. in 6670 cc. of water at 25°. According to our finding 1 Gm. is soluble only in 40,000 cc. of water. It is recommended to have this checked or to describe it as very sparingly soluble in cold water.

2. MELTING POINTS.

The melting point gives a good indication of the purity of organic substances and is therefore an important specification.

In some U. S. P. X products the melting point specifications are decidedly too low for present-day standards of purity, and it is proposed to give these higher standards official recognition by raising the melting point specifications as recommended in Table II.

DETERMINATION OF MELTING POINT U. S. P. X PROCEDURE.

The rate of heating by U. S. P. X procedure is 3° per minute beginning 25° below the expected melting point, then when the substance begins to melt, carefully regulate to 0.5° per minute. We have found it practically impossible to change the rate of heating from 3° per minute to 0.5° per minute in the very short space of time this method will allow for most of our products.

We recommend that a uniform rate of heating be used so that no adjustment is necessary while the material is melting, thus simplifying the test materially. A rate that we find works very satisfactorily for routine work is to heat the bath rapidly until the temperature is about 10° below the expected melting point, then regulate the rise to 1° per minute maintaining this rate until the melting is complete.

3. DETERMINATION OF BOILING POINT.

According to U. S. P. X procedure (*Method I*) a 25-cc. sample is distilled in a 50-cc. flask at a rate of 1 cc. for each 15–20 seconds. The thermometer is read when five drops have distilled into the receiver, for the first point and when 95% (23.75 cc.) has distilled, for the end-point.

With high boiling liquids, such as methyl salicylate and guaiacol, we have not been able to distil 95% of the sample to obtain the second reading. There is always 2 cc. or more of the sample amounting to upwards of 8 per cent left in the flask as vapor and in the condenser as condensate at the point at which the last liquid evaporates from the bottom of the flask (the dry-point). To continue to heat the flask would overheat the vapor and give an erroneous figure for the end-point.

We recommend that this test be revised so that the last reading will be taken at a point readily obtainable and suggest either 92% (22 cc.) or dry-point as possible end-points.

We have had further difficulty with *Method I* in the rate of distilling notably methyl salicylate. The present method requires distilling at the rate of 1 cc. for each 15 to 20 seconds. It was practically impossible to obtain a rate of 15 seconds per cc. Distilling at 20 seconds per cc. the range of distillation was about 7° C. with a rapid rise toward the end whereas U. S. P. X specifies a range of 5° (219–224°). Incidently only 94% of distillate was obtained after allowing the condenser to drain completely. Distilling at 30 seconds per cc., which is about one-half the speed required by the official method, the range was 4° C., but there was still a rapid rise at the end.

In the distillation of guaiacol (crystals) we did not experience any difficulty with rapidly rising temperatures when distilling at the rate of 20 seconds per cc. However, we again had to let the condenser drain completely to bring the final reading up to 94%.

For low boiling liquids, such as carbon tetrachloride for instance, the U. S. P. X procedure is quite satisfactory.

It is evident, however, that the official method, in regard to second reading and rate of distillation is not applicable to all products particularly the high boiling ones and should probably be investigated for each product separately in which the distilling range is specified.

It is of course desirable to have a method which will fit all products and only in case no agreement can be reached on such a method will it be necessary to make some specific specifications for products which do not lend themselves to the general procedure.

4. ARSENIC TEST IN PHENOLPHTHALEIN.

According to U. S. P. X the sample is prepared for arsenic test by heating 0.2 Gm. in a crucible with a mixture of potassium nitrate and sodium carbonate. When using a porcelain crucible misleading results may be obtained due to presence of arsenic in the crucible.

We had 20 parts per thousand of arsenic reported in a sample in which practically no arsenic existed. When using a platinum crucible the mistake was corrected. This arsenic would have been of little consequence in a 1-Gm. sample but in a 0.2-Gm. sample as directed for U. S. P. test it appeared to amount to a serious contamination.

If this method is continued for arsenic test in phenolphthalein, it would appear advisable to use a 1-Gm. sample and to specify the use of a platinum crucible.

It is also recommended to investigate in a general way the method described on pages 171–173 of 2nd edition of "Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists." In this method a 5-Gm. sample is used and the organic matter is destroyed by digestion in a mixture of sulphuric and nitric acid. This method was found satisfactory for preparing samples of phenolphthalein for arsenic test and it is possible it could be applied generally in U. S. P. products where organic matter is destroyed in preparing for arsenic test.

SUMMARY.

Ether, alcohol and water solubilities of several products could not be confirmed and rechecking and revision is recommended.

The melting point specifications of several synthetic drugs are too low for present-day standards of purity of these products. It is recommended to give these higher standards official recognition by raising the melting point specifications as proposed.

The directions for preparing samples for arsenic test in phenolphthalein are deficient and an improved procedure is suggested.

Changes in the methods of determination of melting and boiling points are recommended.

LABORATORIES: MONSANTO CHEMICAL WORKS,
ST. LOUIS. August 22, 1929.

BIBLIOGRAPHY OF PHARMACEUTICAL RESEARCH

Compiled by A. G. DuMez, Reporter on the Progress of Pharmacy.

All articles in these lists will be presented in abstract form in the bound volumes of the YEAR BOOK, which is issued annually. Those desiring abstracts immediately can obtain them for a fee of one dollar each by communicating with A. G. DuMez, University of Maryland, School of Pharmacy, N. E. Cor. Lombard and Greene Sts., Baltimore, Md.

PHARMACOPŒIAS AND FORMULARIES.

Smith, T. J.
Suggested reforms in the British Pharmacopœia weights and measures
Pharm. J., 124 (1930), 238

APPARATUS AND MANIPULATIONS.

Ubrig, E.
Simple apparatus for preparing distilled water in the pharmacy
Apoth.-Ztg., 45 (1930), 222
Wöhlk, Alfred
A new micro-burette
Dansk Tids. Farm., 4 (1930), 38

PHARMACEUTICAL PREPARATIONS.

Bonis, A.
Constitution of commercial glyzines (glycyrrhiza extracts)
Ann. fals., 22 (1929), 518; through *J. Soc. Chem. Ind.*, 49 (1930), 217
Brodin, H.
Percolation of alcoholic extracts and the rational preparation of extract of ergot
Pharm. Ztg., 75 (1930), 337
Elphick, G. K.
Stability of the tinctures of strophanthus and squill
Quart. J. Pharm. & Pharmacol., 2 (1929), 507
Hallermann, F.
Examination of tincture of iodine
Apoth.-Ztg., 45 (1930), 252
Hilton, S. L.
Notes on Aqua Hamamelidis, N. F.
JOUR. A. PH. A., 19 (1930), 233
Hurd, Charles D., and Puterbaugh, M. P.
Concentration of hydrogen peroxide solutions
J. Am. Chem. Soc., 52 (1930), 950
Kroeber, Ludwig
Fluidextract of Artemisia absinthium
Pharm. Zentralh., 71 (1930), 132
Kroeber, Ludwig
Fluidextract of Rubia tinctorum
Pharm. Zentralh., 71 (1930), 148
Meillere, G.
Determination of chloral in syrup of chloral
J. pharm. chim., 11 (1930), 145
Meyer, Walter
Determination of alcohol in tincture of iodine
Pharm. Ztg., 75 (1930), 273
Wokes, Frank, and Elphick, G. K.
Preparation of liquid extract of ergot
Quart. J. Pharm. & Pharmacol., 2 (1929), 539
Wratschko, F.
Contribution to the determination of ether and alcohol in spirit of ether and ethereal tincture of valerian
Pharm. Ztg., 75 (1930), 319

PHARMACOLOGY, TOXICOLOGY AND THERAPEUTICS.

Allan, H., and Gunn, J. A.
Pharmacological actions of tetrahydronorharman
Quart. J. Pharm. & Pharmacol., 2 (1929), 525
Burn, J. H.
Oral administration of powdered ergot
Quart. J. Pharm. & Pharmacol., 2 (1929), 515
Cole, Howard I.
Reduction of irritation by iodized ethyl esters of Hydnocarpus wightiana oil
Philippine J. Sci., 40 (1929), 499; through *Chem. Abstr.*, 24 (1930), 1466
Dawson, W. T., and Garbade, Francis A.
Idiosyncrasy to quinine, cinchonidine and ethylhydrocupreine and other lævorotatory alkaloids of the cinchona series
J. A. M. A., 94 (1930), 704
Hoyle, J. C.
Toxic effects of irradiated ergosterol
J. Pharmacol. & Exper. Therap., 38 (1930), 271
Perrins, Gordon
Quinine urethane injections
Pharm. J., 124 (1930), 214
Tainter, M. L., and Seidenfeld, M. A.
Actions of eriocomine, a constituent of Eriocoma floribunda
JOUR. A. PH. A., 19 (1930), 229
Tisdall, Frederick F., *et al.*
Antirachitic value of irradiated wheat
J. A. M. A., 94 (1930), 854

Watt, J. M.
Pharmacology of xysmalobinum, a glucoside from Xysmalobium undulatum
J. Pharmacol. & Exper. Therap., 38 (1930), 261

ANIMAL AND VEGETABLE DRUGS.

Dott, D. B.
Official tests for resins of jalap, podophyllum and scammony
Pharm. J., 124 (1930), 213
Fischer, H. A.
Microscopic examination of Ruta graveolens
Pharm. Zentralh., 71 (1930), 162
Harington, Charles Robert, and Randall, Sydney Stewart
Chemical assay of thyroid gland
Quart. J. Pharm. & Pharmacol., 2 (1929), 501
Middleton, G.
Estimation of iodine in thyroid gland, thyroxine and other organic compounds
Quart. J. Pharm. & Pharmacol., 2 (1929), 536
Valaer, Peter, Jr.
A study of the emodin-bearing group of cathartics
JOUR. A. PH. A., 19 (1930), 235

ALKALOIDS AND GLUCOSIDES.

Abildgaard, Jens, and Baggesgaard-Rasmussen, H.
Ionization constants and absorption spectra of ephedrine and pseudoephedrine
Dansk Tids. Farm., 4 (1930), 30
Andant, A.
Fluorescence of alkaloids
Bull. sci. pharmacol., 37 (1930), 89
Bougalt, J.
Action of some organic bases and their hydrochlorides on calomel
Bull. acad. méd., 102 (1929), 235; through *Chem. Abstr.*, 24 (1930), 1466
Cavara, F., and Chistoni, A.
Morphine content of opium from hybrids of Papaver somniferum
Rend. accad. sci. Napoli, 35 (1929), 31; through *J. Soc. Chem. Ind.*, 49 (1930), 263
Ishikawa, Sheütsu, and Maruta, Shozaburo
Preparation of papaverine and thebaine from the residue left after the preparation of morphine
Bull. Hyg. Research Inst. Japan, 35 (1929), 19; through *Chem. Abstr.*, 24 (1930), 1183
Maricq, L.
Potentiometric determination of morphine by the acid of an iodomercuric reagent
Bull. soc. chim. Belg., 38 (1929), 265; through *J. pharm. chim.*, 11 (1930), 175
McCrea, Adelia
Comparative marrubiin content of Marrubium vulgare from European and American seed
JOUR. A. PH. A., 19 (1930), 231
Regnier, Jean, and Mercier, Fernand
Pharmacological properties of the isomers of cocaine
Bull. sci. pharmacol., 37 (1930), 65
Wagenaar, M.
Microchemical reactions of cocaine
Pharm. Weekbl., 67 (1930), 229

ESSENTIAL OILS.

Anon.
Bergamot products
Chem. & Drug., 112 (1930), 290
Romeo, Giovanni
Analytical constants of deterpenized essences
Revista Ital. Essence Prof., 11 (1929), 272; through *Chem. Abstr.*, 24 (1930), 1467

OILS, FATS AND WAXES.

Cole, Howard I.
Constituents of Hydnocarpus wightiana oil
Philippine J. Sci., 40 (1929), 499, through *Chem. Abstr.*, 24 (1930), 1466
Collin, G., and Hilditch, T. P.
Dika fat, a fat from various species of Irvingia
J. Soc. Chem. Ind., 49 (1930), 138 T
Collin, G., and Hilditch, T. P.
Fatty acids of nutmeg butter and expressed oil of laurel
J. Soc. Chem. Ind., 49 (1930), 141 T
Evers, Norman
Permanence of vitamine A in cod liver oil as shown by the color test
Quart. J. Pharm. & Pharmacol., 2 (1929), 556
Evers, Norman
Variations obtained by different observers with the antimony trichloride color test for cod liver oil
Quart. J. Pharm. & Pharmacol., 2 (1929), 566
Schou, Svend Aage, and Jacobsen, Astrid
Preparations and analysis of iodinated sesame oil
Dansk Tids. Farm., 4 (1930), 25

GENERAL CHEMISTRY.

Cocking, T. Tusting
Limits of impurities in pharmacopœial chemicals
Quart. J. Pharm. & Pharmacol., 2 (1929), 570
Swift, Ernest H., *et al.*
Use of the iodine monochloride end-point in volumetric analysis
J. Am. Chem. Soc., 52 (1930), 894, 901

Van Zijp, C.
Contributions to microchemistry
Pharm. Weekbl., 67 (1930), 189

INORGANIC CHEMICALS.

Caley, Earle R.
Sensitivity and applicability of the picric acid test for potassium
J. Am. Chem. Soc., 52 (1930), 953

Fairhall, Lawrence T., and Richardson, John R.
Nephelometric analysis of zinc
J. Am. Chem. Soc., 52 (1930), 938

Fleury, Paul, and Marque, Jean.
Study of the comparative activity of some oxidizing agents on mercury with a view to the determination of the latter
J. pharm. chim., 11 (1930), 150

Pecker, Henri
Alteration of crystalline sodium monosulphide
J. pharm. chim., 11 (1930), 147

Stainier, Joseph
Experimental study of the reactions and procedures for the assay of mercury oxycyanide
J. pharm. Belg., 12 (1930), 213

ORGANIC CHEMICALS.

Bodendorf, K.
New method for the detection of isopropyl alcohol
Apoth.-Ztg., 45 (1930), 222

Charonnat, Raymond, and Delaby, Raymond
Constitution and synthesis of dioxypyramidon
Bull. sci. pharmacol., 37 (1930), 37

Dott, D. B.
Acetylsalicylic acid in solution with potassium citrate
Pharm. J., 124 (1930), 214

Krüger, D., and Tschirch, E.
New reaction for acetic acid
Pharm. Zentralh., 71 (1930), 145

Leffman, Henry, and Pines, Charles C.
Quality of commercial ether
Am. J. Pharm., 102 (1930), 58

Nieuland, J. A., *et al.*
New method of preparing acetals
J. Am. Chem. Soc., 52 (1930), 1018

Rae, J.
Estimation of phenol in pharmaceutical preparations
Pharm. J., 124 (1930), 239

Schorn, E. J.
Quinoline hydrogen peroxide reagent. Color test for aloes
Pharm. J., 124 (1930), 212

Schwyzer, Julius
Manufacture of diethylbarbituric acid
Pharm. Ztg., 75 (1930), 337

Thompson, J. J., and Oakdale, U. O.
General method for the determination of halogens in organic compounds
J. Am. Chem. Soc., 52 (1930), 1195

Wagenaar, M.
Contribution to the microchemistry of cytisine
Pharm. Weekbl., 67 (1930), 205

PRODUCTION AND DISTRIBUTION.

BY DR. ROBERT J. MCFALL.*

Druggists have long realized the need for basic and comprehensive information concerning the various agencies and channels through which merchandise travels from producers to the final sale to consumers. The lack of such knowledge has placed wholesalers and retailers generally at a great disadvantage in the planning of their business. Production in both manufacturing and agriculture has been greatly benefited for many years by the availability of statistical information concerning production. There seems to be little or no question but that distribution will also receive enormous benefit as soon as more comprehensive statistical facts are available concerning marketing.

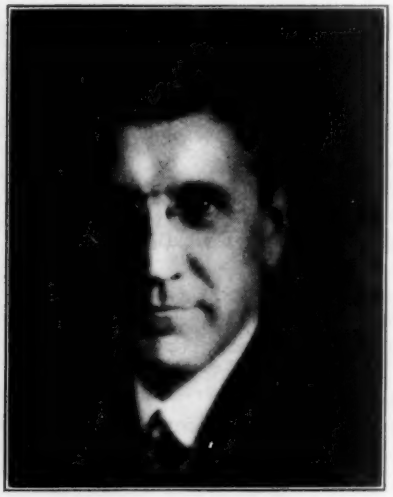
The average output per workers in production has increased 85 per cent since the beginning of the century and 34 per cent since the termination of the World War. No comparable figures are available to show the changes in efficiency in distribution, but the fact that production is taking a smaller and distribution an increasingly larger share of the consumer's dollar than before the war would make it appear that distribution has not increased in efficiency so rapidly as production.

* Chief Statistician for Distribution, United States Bureau of the Census Department of Commerce.

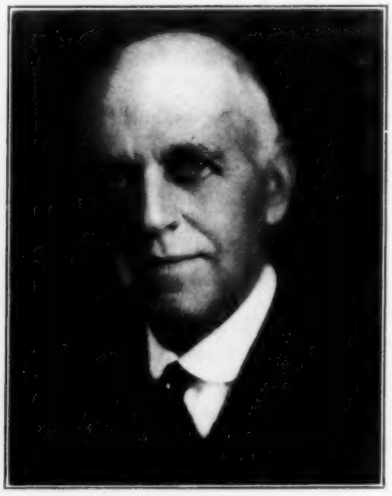
In justice to our distribution system, it must be stated, however, that in many cases the increased cost of distribution may be attributed to better service which is now being rendered. Nevertheless there must be some relation between this situation and the fact that, while abundant data are available regarding production, there are few dependable statistics covering the field of distribution. Thus the big question confronting the business man is how the supplies in all lines of merchandising can be speedily and economically distributed to the consumers, eliminating waste and unnecessary expense.

Until adequate information is available it is wholly impossible to know the many diverse elements of distribution, their operations and deficiencies. There have been some data gathered by governmental and privage agencies on distribution, but the work has been restricted in scope with the result that there never has been a complete picture presented.

For these reasons and many others the first nation-wide Census of Distribution, now being taken, has created wide-spread interest in the business world through whose demand Congress has provided for this study by the Bureau of the Census, which already has arrayed an army of workers to gather the basic facts concerning the vast field of distribution.



DR. ROBERT J. McFALL.
Chief Statistician for Distribution.



WILLIAM M. STEUART.
Director of the Census.

The work is confidently expected to develop important and useful knowledge affecting the economic life of the country. Rough guesses concerning such elementals as the number of merchants in operation, and their total volume of business, will be supplanted by "cold figures." Since the survey is being conducted by the Bureau of the Census, druggists need have no hesitancy in answering the questions, because there is not the slighest chance that the confidential information they give will be disclosed. They are protected thoroughly in this particular by the law, which requires that such information shall never be revealed by the Bureau of the Census, not even to any other Government bureau or department. All employees are sworn to keep secret the figures on the individual returns.

Since the census is being taken at the behest of the business world, and every individual organization is merely a unit in the whole structure which is being measured, the Bureau of the Census is confident that generous coöperation will be accorded it in the work, and hopes the 1930 census of distribution will present a thorough picture of the subject and its many parts. It is realized that one difficulty may lie in the fact that the information possessed by retailers, wholesalers and others may be scant. However, it is certain that the census will compile valuable information and, moreover, will prove a dependable basis for getting additional and comparative material which will prove helpful in the solving of the distribution problems.

To indicate the scope of the work, it may be pointed out that the census of distribution will cover all distributing organizations and their business activities as well as all druggists. It will give account of the various types and sizes of retailers, wholesalers and all other merchandising concerns in the entire country, their sales, expenses, inventories and employees. So far as possible it will provide information relating to goods sold by these various distributors, the limiting factor being the inadequacy of records kept by the rank and file of merchants. Not only will this information be summarized whenever available for each city and county as well as for each state and the nation as a whole, but it also will be published promptly so as to be as timely and valuable as possible.

Every druggist, as well as merchants in other lines, will be in a position to compare his business with that of groups of others in his general locality and in the nation as a whole. Comparisons may be made regarding the amount of sales, proportion of business done on credit, amount of goods returned, inventory, expenses, number of employees, wages and various other items. Information will be sought as to the number of establishments an organization operates or owns in a given line of business in different cities, the character of the organization, whether operated by an individual, partnership, incorporated company or coöperative association. Sales by commodities, such as drugs, pharmaceuticals, chemicals, patent medicines, confectionery, bottled beverages, toilet articles, cigars, cigarettes and other articles will be tabulated.

Every business firm in the country will be canvassed. Each dealer will be asked a number of questions which will supply essential facts. No attempt, however, will be made to discover the amount of profit. All questions to be asked are designed for the purpose of obtaining data to eliminate some of the blindness from competition, to strike out waste, and, in general, to help the druggists and other merchants, to know themselves and their businesses to a point never known previously. The Census of Distribution reports can be compared to a trade convention on a large scale in which merchants exchange among themselves and for mutual benefit many lessons drawn from their practical experience.

The Census of Distribution is designed to give retailers information concerning the number of establishments of each type and size in their community and the average situation of each group as to such matters as sales, inventory, expenses, employees, services, and so forth. Moreover, it will acquaint retailers with the proportion of business done by chain stores as against independents, the degree to which stores of various types sell goods more generally supposed to be sold by stores of another type, and the proportion of retail sales in their region made on credit, and what proportion of sales is offset by returned goods. The census also will help manufacturers and farmers in their field of production, and finally it will help the consuming public which will benefit by lower prices or better service supplied through more efficient distribution.

BRITISH REGULATION OF SALE OF DRUGS AND POISONS.

The report has been issued of the British departmental committee appointed in July 1926, to consider whether any modification in the poisons and pharmacy acts are desirable. The committee has made a number of important recommendations: 1. That the profession of pharmacy and the control of poisons be kept distinct and dealt with in separate parts of the act. 2. That it shall be unlawful for any person not a registered pharmacist to use any title or description calculated to suggest that he possesses any qualification with respect to the selling, dispensing or compounding of drugs. 3. That the central authority for poisons be the home secretary, assisted by an advisory committee to be called the "Poisons Board," whose functions shall be to prepare a "poisons list" and to assist in making rules with respect to the sale of poisons. 4. That power be given to prohibit the sale of certain poisons except on the prescription of a physician, dentist or veterinary surgeon.

There will be held in Lima from July 4 to 11, 1930, the Second Exposition of Hygiene, together with the Sixth Pan American Child Congress. Dr. Alfredo Delgado, Lima, has been appointed General Commissary of the Exposition, under the direction of the Bureau of Health. The exposition will have the following sections: Medicinal, chemical, biological and dietetic products; children's meals, infants' hygienic articles, models of children's welfare institutions, medicinal foods, hygienic foods and beverages, X-ray, medicinal and surgical and dental instruments, orthopedic apparatus, sanitation works, etc.

DEPARTMENT OF BUSINESS MANAGEMENT

Conducted by Paul C. Olsen.*

COMMENTS, QUESTIONS AND SUGGESTIONS ARE INVITED AND WELCOME.

Readers are invited to submit comments, criticisms and suggestions regarding the material which appears in this department. The Editor also will undertake to answer questions regarding general problems of business management. Letters of general interest will be published, but the writer's name will not be revealed without his permission.

WHAT IS NEW IN THE PRICE SITUATION?

BY PAUL C. OLSEN.

Reports are being published in the drug journals and even in the daily newspapers of the efforts of drug chains and others to raise the prices of many items of popular merchandise from the levels to which keen price competition in many localities has lowered them. At the same time reports come from Washington of the progress of the Capper-Kelly Fair Trade Bill; as everyone knows, it is now in a more advanced position in Congress than at any time in its long and tempestuous history.

With these two facts, now so prominently before them, some people in the drug trade may conclude than an era of peace and tranquillity, in so far as price competition is concerned, is about to dawn in the drug trade. Unfortunately, however, this can hardly be expected, in my honest opinion at least. If anybody disagrees with me, I should be very glad indeed to have them correct me and set me right.

Consider, first, one of the possible effects of the Capper-Kelly Fair Trade Bill,[1] an effect which for some reason hasn't been given much publicity. A nation-wide investigation of the Druggists' Research Bureau showed that the usual number of brands of tooth pastes stocked in drug stores ranged from 12 to 31, according to the

---

* Lecturer on Business, Columbia University and Philadelphia College of Pharmacy and Science.

[1] *This very important fact should be taken into consideration*—that the enactment of the Capper-Kelly Fair Trade Bill *will* legalize the making of price maintenance agreements between manufacturers and their wholesale and retail distributors as well as between wholesalers and retailers. By this enactment, it will virtually compel every manufacturer and distributor of merchandise sold by the drug trade to take *a positive and definite stand for or against price maintenance agreements*. As things are now, a manufacturer or a distributor can plead that he gladly would enter into price maintenance agreements if it were possible legally for him to do so, although secretly believing and encouraging just the opposite viewpoint.

Congressman Clyde Kelly, who has consistently given time and effort to the measure referred to, some time ago closed a masterful and timely address in which he pointed out the dangers of uncontrolled price cutting by saying: *"I am willing to rest my case on the principle that public policy requires that independent business men of full age and competent understanding shall have the right to contract to uphold a uniform price policy on standard goods, and that such contracts, entered into freely and voluntarily, shall be held good and shall be enforced in courts of justice."* It is hoped that the Capper-Kelly Bill will become a law and prove to be a means for correcting the greater evils of price cutting.

type of store. These numerous manufacturers of tooth paste are in keen competition with each other. If you think all the competitive troubles in the drug trade are confined to the retail business just ask a few of these tooth paste manufacturers about competition as they face it.

Suppose with the enactment of the Capper-Kelly Fair Trade Bill, eleven tooth paste manufacturers enter into agreements individually with their retail distributors to sell tooth paste only at the traditional 50-cent price. But along comes manufacturer number twelve with a tooth paste which, incidentally, is not, in efficacy, materially below or above that of the other manufacturers. Moreover, careful and wide-spread advertising has created for this twelfth tooth paste a consumer acceptance which is comparable to that existing for the other popular brands.

Competition is keen. The twelfth manufacturer, perhaps late in the field, must have volume to make profitable the manufacturing and selling facilities that he has created. Isn't he likely to see an opportunity to obtain this volume by permitting his retail distributors to sell his tooth paste an any price they choose?

Put yourself in the customer's place. She sees twelve well-known tooth pastes, all of which have characteristics which certainly are somewhat similar and all of which are equally well known to her. Eleven are and must be offered at 50 cents, on account of agreements between their manufacturers and retailers. The twelfth tooth paste is offered at 33 cents or 37 cents or some similar price. Which tooth paste is this shopper most likely to buy? What is going to be the effect upon the sales of other 50-cent tooth pastes? How long are manufacturers going to maintain agreements of this kind, if it results in their losing volume to manufacturers who do not have such agreements as will be permitted under the Capper-Kelly Fair Trade Bill?

Bear in mind, please, I am not making any statement now for or against the ethics of the question. Nor am I attempting any defense or criticism of the well-known loss leader principle.[1] *My purpose simply is to set down the facts as they appear to exist.* I have chosen tooth paste, not as a haphazard example, but because this class of merchandise is one of the most important in sales volume in drug stores to-day. One-third to one-half of drug stores' sales of toilet goods are in dental preparations and the bulk of these sales in tooth pastes.

The present widely heralded price-raising efforts of retail distributors of drug merchandise, who in the past have used reduced prices in popular merchandise in an effort to attract business, are not likely to go as far as some hopeful people anticipate. In the first place, as every druggist knows, it is far more difficult to raise a price on a standard identified item, particularly on one which is popular, than it is to lower such a price. Thus, if any success at all is to be had in this movement, it is going to be a slow and a long drawn-out effort.

On the other hand, don't forget that even in the drug trade the price appeal is the quickest means to build a large volume of business. I say "even in drug trade,"

[1] The ethics of price cutting and loss leaders have been discussed frequently and competently by persons far better qualified than I am. Justice Brandeis, while still a member of the bar said: *"Americans should be under no illusions as to the value and effect of price cutting. It has been the most potent weapon of monopoly and means of killing the small rivals to which the trusts have resorted most frequently."*

because the small value of the individual sales made in drug stores necessitate a store which is to do a large volume of business locating itself in a center, which is accessible to large numbers of people. Everyone knows, of course, that there have been out-standing and exceedingly profitable prescription stores with large volumes of sales developed in the United States, but the growth has been the result of years of patient, intelligent and tactful effort.

The druggist who has $30,000 a year rent to pay can't wait long for a business sufficient to justify the payment of that rent. Since few people have all the money they want to spend, and those who do are usually the most careful with it, the price appeal is a quick means of attracting a large volume of business. At least, so the theory goes. But when a dozen or hundred competitors all do the same thing for this same purpose, there is bound to result a price war, which is unprofitable for all. Hence, the present efforts to raise the prices of popular merchandise to more profitable levels. But once prices are raised, then what? Some one of these distributors, under greater pressure of volume than others, perhaps, starts cutting prices once more and the vicious circle begins all over again.

If price competition could be confined to stores which choose this method of attracting business, other druggists would not resent it so much. Window displays which are passed by thousands of people daily are bound to bring to the attention of people the low prices at which standard merchandise is being offered and thus create demands on other druggists to do the same thing.

The development of chain drug stores with several stores in the same cities has made it possible and profitable for them to use extensive and frequent newspaper advertising. In contrast to the thousands who are likely to see a window display, 100,000 or 1,000,000 may see at the same time the salient features of that display reproduced in a newspaper advertisement. The frequent use of two full pages of newspaper advertising by a single chain of drug stores is now not at all unusual. The effect and the intended effect is to bring the competition of these stores to every point to which the newspaper circulates. In further extension of this idea, mail ordar service is offered sometimes as an additional inducement.

Popular merchandise sold at the so-called full prices produces exceedingly attractive profits. That is the real reason there is a cut-price problem to-day in the sale of popular identified drug merchandise. Druggists who have been anxious to or who have been forced to obtain a large volume of business quickly have naturally been willing, therefore, to sacrifice some of these profits by reducing prices on such merchandise. As long as this condition exists, it is logical to expect keen and widespread price competition on popular merchandise.

---

1. We strive to safeguard public health by coöperating with all departments created and operated for that purpose.

2. We advocate the raising of entrance requirements in the colleges of pharmacy, the selection of more mature students and the requirement of more practical experience in the retail field before graduation.

3. We urge a closer study and application of the Pharmacy Law in order to realize the original intent of the law and to confine the sale of drugs and medicines to legally-operated drug stores.—From the Code of Ethics of the Retail Druggists' Association of Greater Kansas City.

A NATIONAL PHARMACY WELFARE FUND.*

BY EDWARD SWALLOW.

It has afforded the writer much pleasure to watch the interest that has been created among American pharmacists by his suggestion for the creation of a National Pharmacy Flag that shall represent American Pharmacy. This idea has spread to Australia and is being received by our brethen there with considerable enthusiasm. While it is yet too early to state definitely that such a national pharmacy flag will result from our efforts in giving the suggestion publicity, we can say that the indications are favorable.

In introducing the present subject, which will be discussed in this paper, it was necessary to mention the suggestion concerning the creation of a national pharmacy flag as it is upon the success of this project that the new idea embodied here depends. When the idea for a pharmacy flag occurred to the writer, after thoughts upon the subject convinced him that a national pharmacy emblem could be used for many useful purposes by the druggist generally, the one that appealed most strongly was—that a fund could very easily be created yearly, having for its object the caring for our incapacitated fellow-craftsmen and those who were too old to practice their calling any more.

If we are successful in our efforts to produce a national pharmacy flag, it would be very simple work to appoint a Pharmacy Flag Day, and this would mean that over 54,000 drug stores would fly their flag upon that day. Estimating that we have at least 100,000 registered pharmacists in the United States, a contribution of one dollar, laid out in purchasing a Pharmacy Flag, would create a fund of such proportions as to make it possible for American Pharmacy to care for all those incapacitated members who are sick or otherwise unable to care for themselves. Thus, by the expenditure of one dollar yearly, the pharmacist would place his unfortunate brothers in comfort and prevent those in distress from becoming public charges.

If this suggestion meets with approval, we might call such a fund—"The National Pharmacy Welfare Fund." As a general proposition, this Pharmacy Fund, would be national in its scope, something that is very much needed in the way of bringing unity and coöperation among the pharmacists of America. This fund would be placed in the hands of the AMERICAN PHARMACEUTICAL ASSOCIATION, thereby bringing our *Mother* of American pharmacy in close touch with all her *children*—a very desirable result.

A movement like this would naturally result in a largely increased membership and the A. PH. A. would become a much more powerful organization for the betterment and progress of our calling.

The pharmacist is a self-respecting, capable, professional, business man, who, while he renders scientific services of the highest kind to the public, does not want assistance from this source any more than a physician does from those to whom he renders *his* professional services. There exists a true spirit of brotherhood with our profession generally but, hitherto, we have never given vent to our sympathies with those of our calling who need it. Here we have a golden

* Section on Practical Pharmacy and Dispensing, A. PH. A., Rapid City meeting, 1929. Read by title.

opportunity of doing so at a trifling cost of one dollar per year from each registered pharmacist. For this amazingly small sum we not only insure each one of us against sickness and impoverished old age, but in doing so, create a *National Pharmacy Welfare Fund* that will show the world how we do things in America.

This fund should find a home in the Pharmacy Headquarters, from whence will flow loving sympathy and practical help for those who are sick, incapacitated through old age or other causes.

In this spirit of "one for all—and all for one" we can add more dignity and respect for our profession and incidentally to each member of the profession who may go about his business feeling that should misfortunes or sickness overcome him or poverty stare him in the face in his old age, a nation-wide body of *his* brethen stand willing and ready to provide relief and a permanent assistance.

Should this national appeal to the common sense and dignity of our brethren result in action being taken and a committee be proposed, the writer requests that a capable man be picked out as chairman, as he neither deserves this honor nor would he be able to cope with the work entailed, because of age and physical infirmities.

The seed is planted—having the germ of human kindness and sympathy all ready for growth—a growth that may be made to produce the richest fruits for the benefit of our distressed brothers. Independent of a Pharmacy Flag—this National Pharmacy Welfare Fund should be made possible so that *American* pharmacy can function in self respect, dignity and benevolence.

Pharmacy should care for its own!

WHY CANDIDATES FAIL STATE BOARD EXAMINATIONS.*

A STUDY IN DISTRICT NO. 3.

BY RUDOLPH H. RAABE.

When it became generally known that a very high percentage of the graduates of recognized colleges of pharmacy were failing in the State examinations, steps were taken to learn, if possible, the causes of these failures. Plans were made whereby the state examining boards and the colleges could have joint conferences on matter of pharmaceutical interest. One of the first problems discussed was "failures in the state examinations."

In Ohio, the joint conferences between the State boards of pharmacy and the colleges proved very helpful. It gave the examiners an excellent opportunity to get the viewpoint of the colleges and *vice versa;* much good resulted. Discussions along this line in the district and national meetings also proved to be highly worth while and very helpful.

Inasmuch as these discussions (district, state and national) did not reach the instructors in our colleges in the most forceful form, or, perhaps, did not reach them at all, your humble servant decided he would bring this matter to the attention of his teaching staff by placing the following circular and questionnaire before them:

---

* Section on Education and Legislation, A. PH. A., Rapid City meeting, 1929.

To the Instructors of Pharmacy Students:

Efficiency of college graduates (pharmacy) again requires our attention.

Young men and women, the sons and daughters of no mean parentage, come to us well recommended by high school authorities and in many instances by others of good repute. These same young men and women pursue their objective until they satisfactorily complete a prescribed course of study...then comes commencement...state examination...field of practice.

No attempt will be made at this time to further study our responsibilities respecting successes or failures in the field of practice. This study will be limited to the failures in state examinations.

Do you believe that all graduates of reputable schools of pharmacy should be able to pass the state examinations on first attempt?

...

Do you believe that the failure of a graduate in a state examination indicates that the instructor is inefficient?

...

Approximately 40 per cent of all college graduates fail state board examinations. What is wrong?

...

May we have your assistance in answering these questions? Early replies directed to the Dean or personal conferences will greatly aid this office in giving the true viewpoint of our staff of instructors on these questions.

(Signed) RUDOLPH H. RAABE.

The questionnaire created much interest and most of the instructors wanted a conference with his Dean before answering the questions, feeling perhaps that a diversity of answers may lead to wrong outside impressions. They were told that these questions had been discussed in state, district and national meetings and that now we wanted the opinion of each member of the teaching staff on these questions. Nothing was said in the private conferences that would in any manner have any influence upon the answers. Each member of the staff seriously and earnestly discussed the questions; each one felt that these were very important questions and that it was a very serious piece of business.

Because of the wholesome stimulation thus far created by the questionnaire and for the interesting replies received, it was deemed advisable to enlarge the field of inquiry. In response to this desire five copies of the questionnaire were sent to each of the Colleges of Pharmacy in Indiana, Illinois, Kentucky, Michigan, Ohio, Wisconsin, hoping that the questionnaire would be of interest to them and that a tabulation of these opinions would be sent to them if they would be kind enough to assist in getting the data to us.

Inasmuch as the state boards are vitally interested in this phase of pharmacy and that they could reasonably be expected to assist in this work, the questionnaire was sent to each member of the Board of the states just mentioned.

Number of questionnaires sent to State Boards	30
Number of questionnaires sent to Colleges	85
Total	115
Number of replies from State Board members	19
Number of replies from College faculty members	31
Total	50

Answers to first question (Pass state examinations on first attempt?)

Boards.	Colleges.	Total.
Yes, 14; No, 5	Yes, 14; No, 17	Yes, 28; No, 22

Answers to second question (Instructors inefficient?)

Boards.	Colleges.	Total.
Yes, 0; No, 19	Yes, 0; No, 31	Yes, 0; No, 50

Answers to third question (What is wrong?)

		Boards.	Colleges.	Total.
a.	High School not sufficient	2	2	4
b.	One year pre-pharmacy course	2	0	2
c.	Faculty experience	5	0	5
d.	Nervousness at Board examination	5	9	14
e.	Faculty grammar school	2	3	5
f.	Student satisfied with minimums	7	3	10
g.	Colleges too lenient	2	6	8
h.	Nothing wrong	1	0	1
i.	Poor judgment	5	1	6
j.	Low standards for entrance	1	4	5
k.	Individual himself	1	1	2
l.	Colleges too ethical	1	0	1
m.	Colleges don't give reviews for examinations	2	1	3
n.	Boards ask practical questions	1	0	1
o.	Unfavorable social life	2	0	2
p.	Field too large	0	2	2
q.	Boards and colleges do not have same viewpoint	0	12	12
r.	Ambiguous questions	0	3	3
s.	Unfair questions	0	3	3
t.	Teach more pharmaceutical chemistry	0	1	1
u.	Examination at fault	0	3	3
v.	Poorly qualified Board	0	8	8
w.	Boards not up-to-date	0	2	2

Many of the replies to the questionnaire have elaborate answers. A few of the following quotations will serve to illustrate:

Boards:

"Failure to pass the examinations the second or third try may reflect on the school."

"Passing state board examination lies entirely with the student."

"I do not believe in cram courses but I think the college owes it to the student to give some attention to training the man so that the knowledge he has can be used to answer board questions."

"Have more failures in college and less failures in State examinations."

"The fault is undoubtedly due to the instruction somewhere."

"Colleges do not grade close enough."

"High School graduation hardly prepares for study of pharmacy."

Colleges:

"Viewpoint of examiners and instructors do not coincide."

"Lack of coördination between college curriculum and Board examination."

"Consistent failures in any one branch is a clear indication of inefficiency of the instructor."

"Habit of graduating students on the basis of attendance rather than on scholarship."

"Weed these individuals out early." (Poorly prepared.)

"They (Board members) may not have more than a minimum education. Usually their education was obtained some years before and they have not kept 'up-to-date.' Boards are to be congratulated in some instances for keeping unfits out of the profession."

"As far as I know only two of our graduates have failed since 1898."

"A preconceived correct answer, right from candidate's viewpoint and wrong from that of the examiner's."

"Lack of appreciation on the part of the student of the vast amount of material he must cover. In consequence he fails to keep his work up. Then in the last few weeks he starts in a wild effort to cram up on all his work. As a result he has a great mass of material which gives him a bad case of mental and confused indigestion."

"The fault lies...with the fundamental principle of education...the student now goes on through high school and even through college....Any instructor recognizes this but what instructor will fail half his own class?"

CONCLUSIONS.

A careful study of the answers and comments in the replies to the questionnaire leads to the following conclusions:

1. Preliminary education and training may be at fault.
2. Conservative entrance standards should be carefully observed.
3. Students who are indifferent toward their college work should be dropped.
4. Joint conferences between Boards and Colleges should be established.
5. Applicants for registration should not feel that they are about to receive the "Third Degree."
6. State Examiners should be fully conscious of the trust reposed in them and to be able to ask such questions as will enable them to properly judge the candidate.
7. The cause of failure lies not with any particular group.

ABSTRACT OF DISCUSSION.

In reply to a question relative to the percentage of failures, the author stated that in the district dealt with, the percentage ranges around 40 per cent.

F. W. Meissner was of the opinion that deficiency in preliminary education contributed largely to failures. He was of the opinion that in examinations there were quite a number who had been unsuccessful in previous trials.

A. H. Clark said that conferences of board members and members of faculties are helpful in correcting matters of the kind under discussion.

Chairman Winne referred to the proposal for postgraduate study to be established under the direction of the N. A. B. P. He asked Professor Cook to speak of coöperative study with faculty members.

Responding, the latter said that the study by members of boards could be supplemented by laboratory demonstrations and talks in colleges near to where the board examinations were being held; the coöperation of boards and colleges would prove helpful.

Chairman Winne supplemented the remarks of the foregoing speaker, stating that board members would gain by such conferences in renewing their knowledge on a number of subjects and gaining knowledge of subjects which have more recent application.

A. H. Clark, said that a dinner affords an occasion for discussing subjects in which both board members and teachers are interested.

F. W. Meissner was of the opinion that all board members should be members of the AMERICAN PHARMACEUTICAL ASSOCIATION; that the discussions, such as this, are helpful to all participants and it is hardly possible to have such opportunities otherwise.

Louis Emanuel agreed with Professor Clark. He was of the opinion that much information could be derived if, out of an examination, the papers of a certain number who had made highest marks, a like number of those who had just made passing grade and a like number who had made the poorest records were submitted for study by members of boards and members of faculties. He thought this would be a postgraduate subject of profitable interest.

The author of the paper was of the opinion that the candidates' papers are sometimes marked according to the method employed, whether U. S. P., whereas another method given may deserve favorable marking.

Leonard O'Connell suggested that careful study of board questions sometimes indicates that more weight is given to isolated fact data than to the principles upon which the work depends.

THE DEPARTMENT OF THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

C. B. JORDAN—CHAIRMAN OF EXECUTIVE COMMITTEE, A. A. C. P., EDITOR OF THIS DEPARTMENT.

The following article by Prof. W. Bruce Philip, of the University of California, is very timely, since many of our colleges are considering the employment of a *personnel officer*. His idea is not quite the same as the ideas carried out by many of our colleges through their personnel service but he has hit at the same problem. I believe the time has come when the colleges of pharmacy must seriously consider the employment of a *personnel officer* to look after the interests of their students. An officer that can combine the usual personnel work with the services indicated by Professor Philip would, I am sure, more than pay for his recompense.—C. B. JORDAN, *Editor*.

A NEW FACULTY MEMBER.

BY W. BRUCE PHILIP.

I bring this subject before the AMERICAN PHARMACEUTICAL ASSOCIATION by presenting this paper before the Conference of Teachers of Commercial Pharmacy of the American Association of Colleges of Pharmacy.

Will we agree that the drug store is dependent for its Pharmacy upon the Colleges of Pharmacy, and that the Colleges of Pharmacy are dependent upon the drug stores for employment for their college students and graduates? If this is so, and it is, why is there the cry on the part of the druggist, "What is wrong with the Pharmacy College?" and the cry on the part of the Pharmacy College, "What is wrong with the drug stores?" Nor is this the only cry. Both the druggist and the College of Pharmacy cry, "What is wrong with the student?" especially the student working in a drug store during his college term.

I am firmly convinced that there is nothing wrong with the student, the college nor the drug store. It is the coördination of these three that is lacking. The retail druggists' associations and the pharmacy associations have been trying to coördinate these three, but there is no possibility, as I see it, of organization doing a complete job. In like way some member of the faculty, usually the Dean, has tried to fill the gaps between the three—college, student, drug store. He, too, has failed to completely take care of the problem. Let me try and pen-picture what I have to offer to fill the gaps and bring together these inseparable parts of Pharmacy.

Professor Jones, we will call him, starts to prepare his work for the opening of the college. His College of Pharmacy is located in one of the larger cities of the United States. He has visited each and every drug store, not only in the city where his college is located, but within a reasonable radius of that city, covering a district as far as there is a daily commute service between the college and the different points. During this visit and repeated visits he has classified and appraised each drug store, the owner, the help employed, and at least something of the character of the trade that supports each store, as well as the service rendered. He has discussed with each proprietor the problem of the student at the college, the college work itself, and the progress and needs of Pharmacy. He knows all the drug stores and knows all the drug store owners. This information

he has charted. The conclusions he has arrived at are checked by visits to the wholesale drug and jobbing houses and to the offices of the pharmaceutical associations. Not only has Professor Jones obtained this valuable information but he has begun a very important part of his work. He has started an educational program by which the drug store owner learns just what he might expect of a Pharmacy College student or graduate; how many hours the student should and can work; what the college intends to teach the student and what the college does not intend to teach the student. By patience, tact and experience he has arranged so that all requests for student employment are referred to the college and by the college referred to him.

When enrollment starts at college, Professor Jones assists the dean, secretary and registrar. Every student fills out an employment blank and this is filed with Professor Jones. Then follows a personal interview with each student by Professor Jones and an educational step of great value is started. The student is drilled by Professor Jones as to how to look for work; how to make his or her first personal application when asking for a place to work; if necessary, starting the student in his work. To Professor Jones' judgment is left the selecting of the student for each special place. As an example: the student must have money to complete his work and the place that paid money and he would be brought together. Certain boys would be kept away from stores too near the bright lights. The miserable hit or miss system now in vogue would be replaced by one of system and coördination. Professor Jones would, if necessary, introduce the student to the proprietor. From time to time he would check both with the students and the proprietors on the work, the student's work and the character and kind of work. This would not be a check of a snooping character, but a pre-arranged agreement, based on common sense and good business principles.

Will you not agree with me that the sale of the college and the student to the retail drug store would thus be well begun? Professor Jones is not any employee picked for the job. He is a man of vision, understanding and learning. His intimate relationship with the retail drug store gives him an insight into the drug store needs, too valuable to rest in any card index. By conference with the Dean and the faculty he reports from time to time his findings. He brings before a fair and interested tribunal the demands and pleas and needs of the employers of our college students and college graduates. He coördinates our Pharmacy. Besides this, he takes the next step and extends the area of his field of operation. All graduates must be placed. Therefore, laboratories and industrial plants must be visited so that our specially-trained technical men may find proper employment, "each square peg in a square hole," "each round peg in a round hole."

Your help and full expression of your opinion is needed on this subject. A modified plan can be used by colleges away from large centers. This work is a big man's job; it needs all of his time. In time he will need assistants.

How are you going to sell real Pharmacy and place your college, your college students or graduates in the drug store without proper personal supervision? How are you going to sell the real drug store needs to our Colleges of Pharmacy without Professor Jones' concrete, practical facts? Chain store organizations and good business training teach us that we must have specialists trained in each department. Your present faculty proves this fundamental principle. We need this

specialist in a contact or coördinating department. Do not start counting the cost. Count the results. The loss and chaos of to-day justify the expense. Professor Jones is a profit man and sadly needed, call him by whatever title you choose. If I offer any warning, it is, select him with great care. The right man will find his opportunities unlimited.

STUDENT BRANCHES OF AMERICAN PHARMACEUTICAL ASSOCIATION.*

BY. B. V. CHRISTENSEN.[1]

A recommendation presented by the Committee on Activities of Students and Alumni and adopted by the 1928 meeting provided that "the president appoint a committee of three to determine the possibility of making such arrangements as are necessary for the establishment of what might be termed student branches of the A. PH. A. in the schools and colleges of the ASSOCIATION." In accordance with this recommendation, such committee was appointed and a report was prepared, together with recommendations, which was acted upon at the present meeting. Since a committee report should properly be condensed, it was thought advisable to present a paper at the meeting of the Section on Education and Legislation explaining the motives suggesting the formation of student branches and also embodying a few suggestions regarding plans of procedure in the organization of such branches and the type of program that would justify the establishment of such student organizations.

It is claimed that pharmacists are not as active nor even as much interested in either local, state or national professional organizations or group movements as are the members of other professional groups. This apathy or indifference is very likely partially, at least, due to the fact that pharmacists as a group are not well-informed regarding the character, purposes, problems and accomplishments of their professional organizations. Hence, if this is true, if an educational program were adopted which would inform pharmacists and prospective pharmacists regarding the character, purposes, problems and accomplishments of the various pharmaceutical organizations and their value and importance in enhancing the interests of pharmacy as a profession, such a program would undoubtedly be of significant value in directing future tendencies and promoting future progress in pharmacy. Furthermore, pharmacy has been blessed with a number of outstanding internationally recognized contributors to science, and a knowledge of such men and their accomplishments should inculcate in the minds of young men a distinct pride in their profession and a spirit of loyalty which is to-day sadly inconspicuous.

With college prerequisite laws effective in thirty-six states and the District of Columbia, a large majority of the coming generation of pharmacists will of necessity be enrolled as students in schools and colleges of pharmacy in the near future. Hence, they can be more conveniently and probably more effectively reached as a group through the colleges of pharmacy than in any other way. However, since

---

* Section on Education and Legislation, A. PH. A., Rapid City meeting, 1929.

[1] Professor of Pharmacognosy and Pharmacology, College of Pharmacy, University of Florida.

curricula are already crowded, this phase of education will probably have to be carried out as a sort of extra-curricular activity, and hence, it appears that the organization of Student Branches of the A. PH. A. in schools and colleges of pharmacy would serve satisfactorily as a means for carrying on this phase of pharmaceutical education.

In studying the Constitution and By-Laws of the ASSOCIATION, a statement of eligibility to membership was noted in Chapter IX, Article I, which reads in part ". . and other persons interested in the progress of the art and science of pharmacy . . ." It appears that this would permit student membership, but it is apparently implied that under the present Constitution and By-Laws, students must comply with all other requirements of regular membership. Hence, in order to establish student branches it is evident that it will be necessary to amend the By-Laws by adding a section outlining eligibility, election, dues, etc., somewhat similar to Chapter VII, "Local Branches."

OBJECTS.

It is not necessary to repeat here the various articles embodied in the proposed plan but it might be advisable to call attention to a few of the provisions and to offer a few words of explanation.

Referring to the objects of student branches, it is to be noted that the AMERICAN PHARMACEUTICAL ASSOCIATION and the National Association of Retail Druggists are mentioned specifically. This was done for the reason that very likely these organizations are of more direct interest to pharmacists in general than are the other national associations which are recognized in the House of Delegates and, therefore, it was considered advisable to emphasize this point by direct reference. While such organizations as the American Association of Colleges of Pharmacy and the National Association of Boards of Pharmacy have made important contributions to the progress of pharmacy, it is doubtful whether it would be possible to develop a strong interest in these associations among pharmacists in general. The Association of Colleges of Pharmacy is of more interest to teachers and the Association of Boards of Pharmacy is more directly concerned with board problems. However, the interests and problems of all are correlated and overlap to some extent and hence, the clause "And the other national organizations represented in the House of Delegates" implies that these should be given due consideration.

MEMBERSHIP.

With respect to membership it is suggested that student branches shall consist of active student members and active faculty members, but faculty members are not to be included in the required quota of fifteen student members nor in determining representation in the House of Delegates. It was deemed advisable to permit faculty members of the A. PH. A. to be active members of the student branches to serve as a stimulus and as a nucleus around which to build up the student branch. This should also serve as a stimulus to the faculty members to actively assist in and guide the activities of the student branch. At the same time you will note that it does not permit a faculty member to be counted as a student member in any sense and with respect to the remission of $2.00 to the student branch this would not apply to faculty members. This is understood to provide further that

faculty members could not represent a district in the House of Delegates. Briefly, the intention is that faculty members shall serve primarily in an advisory capacity to the local student branch and the domination of student branches by faculty members in any of its activities should be carefully avoided. These are intended to be fundamentally student organizations and every effort should be directed toward enlisting the interest and promoting the activity of students. In this connection it might also be suggested that there is no reason why local druggists could not attend the meetings of the student branch. As a matter of fact, it would probably be advisable to invite them to attend, as this might be a means of interesting them to the extent that they would become members of the A. PH. A. There might be some objection to this, namely, that the non-member druggist would be deriving the benefits of the organization without contributing to its support. In localities where a local branch exists, it might be advisable to hold joint programs as well as coöperate in other ways.

DUES AND FISCAL YEAR.

While dues are set at $5.00, the only publication that student members are entitled to is the JOURNAL of this ASSOCIATION. However, in lieu of the other publications granted to regular members, $2.00 are [illegible] d to the local student branch. Inasmuch as students would probab[illegible]e little, if any, use of the YEAR BOOK it was felt that the remission of $2.00 [illegible]uld be more acceptable as well as more valuable than this publication in promoting the organization and activity of student branches. In order to provide for uniformity in subscriptions and membership it was suggested by Secretary Kelly that these be considered on the basis of fiscal years and that the fiscal year for student members be the same as for regular members. According to this plan, applications accepted after July 1st shall apply to the next fiscal year and in case of students this provision would be an advantage, in that those who join shortly after the college year opens would have the benefit of membership for the first payment for more than one year. When a student graduates all that would be necessary would be for the college to notify the Secretary of the ASSOCIATION of his graduation. Upon the expiration of the year the student would automatically become a regular member and the notice of $5.00 dues would be sent to him in the usual manner, however, without the remittance of $2.00 to the student branch. In the case of dismissal from college, student membership would automatically cease.

DISTRICT MEETINGS.

Since the real purpose of student branches is to stimulate students to become active professionally and to coöperate in this activity, it was the opinion of the committee that some provision should be made to specifically promote the principle of coöperation. It was finally decided that the best way to do this would be by providing an opportunity for active coöperation and hence, the idea of Districts and District Meetings was suggested. Small districts were considered preferable, and so it is proposed that not less than five branches comprise a district. Annual district meetings are optional, but since it is specified that the district representative in the House of Delegates is to be elected at the annual meeting, unless a district meeting is held such district cannot be represented in the House of Delegates. Every possible effort should be made to stimulate the election of district representa-

tives to the House of Delegates and this should serve as an incentive to hold district meetings, and district meetings in turn would serve as an incentive to local representation. Since neither time nor place of the district meetings is specified, it has been suggested that it might be possible to hold district meetings during the annual convention of the A. PH. A., when the delegates might be elected. It might be advisable, however, to hold the district meetings during the academic year while the students are still in college, and if these meetings were held at the seat of the branches in rotation it would give a larger number of students an opportunity to attend. In the deliberations of the district, each member branch should be entitled to one vote. Therefore, it would be necessary that each branch elect a district representative. In regard to expenses incurred in attending such meetings, the various branches could handle that according to convenience, but properly the district should defray the expenses of the delegate to the A. PH. A. meeting.

In conclusion, it might be suggested that two or three strong student branches have already been organized, and if the arrangement under consideration is adopted by this ASSOCIATION we may look forward to gratifying results in the establishment of student branches in the next few years.

The paper was discussed by Messrs. Walton, Raabe and the author, but no definite action was taken. The paper was accepted for publication.

RESOLUTIONS PASSED AT THE JOINT MEETING OF BOARDS OF PHARMACY AND COLLEGES OF PHARMACY OF DISTRICT No. 2, MARCH 24 AND 25, 1930, AT WASHINGTON, D. C.

Resolved, that the original purpose for which the conference was inaugurated, namely, to study our mutual problems, be adhered to.

Resolved, that a committee of six members, three to represent the Colleges and three to represent the Boards, be appointed to study theoretical pharmacy, including Pharmaceutical Latin and Pharmaceutical Mathematics, as it relates to Board examinations and the College of Pharmacy curriculum.

We wish to commend the Committee on Materia Medica for the careful manner in which they approached the subject and for the specific data submitted. It is our opinion, however, that the subject should receive further study in its relationship to the college course of instruction. Therefore be it

Resolved, that the Committee be continued, and be it further

Resolved, that the suggested outline for Board Examinations in Materia Medica submitted as a part of the Report of the Committee be given tentative approval.

Due to the importance and general interest of the papers presented to this conference, be it

Resolved, that the papers presented be published in the pharmaceutical press, the wishes of the author to control in the choice of publication.

In view of the importance of the discussions on various papers presented and for the purpose of permanently recording addresses by those who may not present formal papers, be it

Resolved, that the services of a stenographer be engaged for these meetings, the cost to be met by an assessment on each Board and College participating in the meetings.

Resolved, that this joint meeting approve of the efforts put forth to bring about uniformity in the legal requirements for practical experience.

Resolved, that the National Association of Boards of Pharmacy be requested to prepare a digest of existing experience requirements for the purpose of formulating a uniform standard to meet present-day conditions.

Resolved, that at least one year of practical experience be required in addition to the four-year college course in pharmacy.

Resolved, that this joint meeting express itself on the question whether the year of experience should or should not be acquired subsequent to graduation.

(As this resolution was approved, the subject was discussed and the following resolution was offered:)

Resolved, that the one year of required experience shall be obtained following graduation from a college of pharmacy.

Resolved, that a copy of the Proceedings of this meeting be furnished to the National Association of Boards of Pharmacy and the American Association of Colleges of Pharmacy with particular reference to the recommendations on which national endorsement appears to be advisable.

Resolved, that the program committee be requested to arrange for round table discussions on the subjects to be covered and that the policy of elaborating the program beyond the original purpose of these joint meetings be discontinued.

Resolved, that the thanks of this Joint Meeting be expressed to the following:

1. The officers and members of the Washington Drug Exchange and the District of Columbia Retail Druggists' Association for the hospitality extended to us during this meeting and especially for the banquet on Monday evening.

2. The program committee, the presiding officers, Glenn L. Jenkins and Lloyd N. Richardson and the very able and untiring Secretary, Hugh C. Muldoon, for their efforts in conducting the sessions and recording the transactions.

3. The participants in the program who by their prepared papers and discussions provided food for thought and factual data upon which progressive recommendations may be based.

COMPLETION OF THE JUNIOR COLLEGE THE NEXT PREREQUISITE.*

BY FREDERICK J. WULLING.[1]

The five-year minimum undergraduate course is the next objective in pharmaceutical education. It should be the present requirement and would be such if all pharmaceutical practitioners and educators valued their profession as the members of other professions, with which pharmacy is on a parity or higher, value theirs. Viewed from the standpoints of practitional responsibility and public necessity, pharmacy, in its true aspects, is not secondary to medicine and certainly not to dentistry, law, education, theology, business, engineering, etc., all of which in their respective best schools are already on the minimum five-year or higher basis.

Where the six-year course is the minimum, as in medicine, two years are given to academic and four to technical subjects. The five-year course consists of either one year of academic and four of technical work or two years of academic and three of technical or professional study. The latter division is growing in preference as is evidenced by its adoption by some colleges (of other professions) who had formerly preferred the "one and four" plan. The "two and three" plan, meaning a five-year course consisting of two years of academic followed by three years of professional college work, is growing in favor. It would be the best plan for pharmacy to follow and I venture to predict, on the basis of my faith and confidence in the wisdom and integrity and also in the sagacity and in the discernment of what is best for pharmacy, of the present and particularly of the coming generation of

* Section on Education and Legislation, A. PH. A., Rapid City meeting, 1929.

[1] University of Minnesota.

pharmacists, that the five-year course will become the accepted minimum very soon. Work and efforts toward that objective must be stimulated now and I invite all interested practitioners and educators to join heartily in the preliminaries. These have already begun in Minnesota where through elucidation of the advantages inherent in and subsequent to the completion of five years of study on the "two and three" plan, increasing numbers of students are voluntarily adopting the five-year course. During 1928–1929 eighteen such students were enrolled in the College of Pharmacy of the University of Minnesota.

The "two and three" and "two and four" plans of other professions have been made more attractive and more easily possible because of the junior colleges now increasing rapidly in numbers. The junior college, briefly, consists of the first two years of the traditional four-year academic college course. The third and fourth years of that course are now often referred to as the senior college course, upon the completion of which the student is awarded the bachelor's degree in arts or in science (B.A. or B.S.). Many junior colleges are to be found in the smaller cities or communities, in or near the home towns of the large number of students who are not residents of the large cities or of university or college towns. The convenience and less expense going with the opportunity of remaining at home or near home for two years after high school as against being away from home for that length of time is usually attractive to the students and especially to the parents, as is abundantly proved in Minnesota at least, where increasing numbers of students come to the University after completion of the junior college course in or near their home towns, to enter upon their chosen professional courses. This practice is working out very satisfactorily for those who follow it. It has the fullest approval and support of parents and local school authorities and communities because of its obvious advantages and conveniences.

The present minimum four-year course in pharmacy includes almost universally one year of academic college work above the high school course. In Minnesota, the majority of students in the College of Pharmacy completed the required academic subjects at or near their respective homes and this despite the fact that the College of Pharmacy offers the academic instruction either wholly in its first year, or combined with professional work in the first two years. Students who have completed one year at their local junior college are in many cases easily persuaded to remain another year to complete the junior college. Personally, I have had several successful opportunities with students and with parents toward that end. All these facts point to the easy possibility of making in Minnesota in the near future the "two and three" plan the obligatory one. The College of Pharmacy of the University of Minneosta was the first or one of the first to offer an optional four-year course and many students, comparatively, followed that course, even in the very early times of the minimum two-year course. It now offers an optional five-year course of undergraduate work, and if the rate of increase of enrollment in that course continues, the course will naturally soon become the regular or obligatory one. Other states can do what Minnesota has done and is doing in the matter of arriving at satisfactory pharmaceutical educational standards on a parity with educational standards of other and no more responsible professions.

The old question whether the colleges or the professions which they represent should determine what the educational standards should be has never embarrassed

us in Minnesota, for all concerned have decided the duty belongs to the College because it was established by the state to give courses comparable with those of other state professional colleges and in line with the high standards observed by the State University of which it is an integral and accepted part. That this was and is the right course to pursue is abundantly evidenced by the fact that the State Association and the State Board of Pharmacy have always approved and supported the College in its periodical advancement of standards. Indeed, several times the Association and the Board took the initiative toward higher standards and lately the recently established Minnesota Pharmaceutical Educational Conference actively approved and supported the action of the University Regents when they advanced, upon the recommendation of the faculty, the old optional four-year course to the status of the obligatory minimum course.

I have been asked why I advocate lengthening the undergraduate course rather than advising graduate work in place of the fifth year. My reasons are those which have actuated educators in other professional fields who have the wisdom to know or who learned by experience with the "one and four" plan, that a much better general or academic training than has been the requirement heretofore, is necessary as a foundation upon which to build a solid superstructure of adequate professional education and training. This fact is well recognized by respectable numbers of universities who require the B.A. or the B.S. for entrance upon their technical courses. In my judgment, too, graduate work should be restricted to those who have shown exceptional scholarship, capacity and aptitude in the undergraduate course and who possess unquestioned ability to carry on independent work under the minimum of direction.

In giving notice of the advent of this new forward step, I realize, of course, that not all colleges can follow it; that some will think it foolish or unwise or impractical or unnecessary or even impertinent. My reply is that despite strenuous objections at the time, the three-year minimum course became the standard course elsewhere soon after it was established at Minnesota and that now it has been supplanted by the minimum four-year course. It is very significant and should be emphasized strongly that much less effort and time were required to establish the four-year course than the three-year course. This fact can be explained I believe by: (1) the better and broader mentality brought into the calling by the three-year graduates; (2) by the growing conviction on part of practitioners that the increasing competition in all walks and activities of life can be best met by a more adequate general and specialized training; and (3) by the necessity of meeting in self defense the situation created by the rapid advancement of standards of other professions. The establishment of the five-year course will not be a difficult matter. Pharmacy is by its own lack of right decision and determination still behind other professions which are far below it in responsibility. Professional pharmacy will soon assert itself and will claim its right place earned through adequate accelerating educational standards. A better professional pharmaceutical consciousness is rapidly developing and this will usher in the long-delayed pharmaceutical assertiveness imperatively needed for pharmacy to line itself up respectably with other learned professions.

An interesting and significant fact now developing is the demand toward that end by students. It seems to be no longer the case that nearly all students want

to go forward in the direction of least resistance. More of them are looking ahead far into the future of their lives and careers and are insuring their successes by a better general as well as a more specialized education and training. It may be that in the near future students of maturity of mind will insist that pharmacy offer them a field of activity on a par with those of other but no more responsible professions. It is certain that in the past pharmacy has lost the advantage that would have accrued to it if its matriculants had been of the type and mental maturity that entered medicine and some of the other learned callings. A limited number of students always has gone to the institutions and professions requiring the maximum of preparation and many such have not given pharmacy any thought whatever. These pharmacy lost forever and with them all that they represented and would have projected into the future of pharmacy in matters relating to higher standards generally. Pharmacy needs this class of students badly. This type should be encouraged and invited into the ranks. Pharmaceutical educational administrators could do much in this respect if they would seek the coöperation of their regional junior colleges. From efforts already made in that direction the belief is justified that coöperation would be willingly given toward inducing junior college students to complete the two years instead of one year of their nearest or home college.

ABOLISHING THE ASSISTANT GRADE.

BY A. L. I. WINNE.

For some several years past attention has been directed toward the ultimate elimination of the class of assistant pharmacists which has been tacked on the body pharmaceutic of a great many of the states. This question has been discussed from year to year in the deliberations of the National Association of Boards of Pharmacy, and in the House of Delegates of the AMERICAN PHARMACEUTICAL ASSOCIATION, and both bodies have gone on record as favoring the abolishing of this grade of registration.

The grade of assistant, recognized by formal registration by the state, is a thing peculiar to pharmacy. It is not encountered in medicine, dentistry, law. While these professions have their assistant workers they do not accord them legal status as has been the case in the field of pharmacy. While, in the past, there may have existed justification for this type of registration, looked upon as a stepping stone to higher registration, and as a part and parcel of the apprenticeship system, since the passing of that system and the arrival of the prerequisite laws in a majority of the states, this type of registration is regarded as a detriment to pharmacy rather than as a useful expedient.

In most of the states granting assistant certificates the recipient of such a license enjoys rights under law largely comparable with the rights given to registered pharmacists, and the continued issuing of such certificates will constitute a constant menace to the prerequisite system. With high school education and a few years of drug store experience, so called, an applicant eighteen years of age or more, may secure a license in a great many states and compete with the registered pharmacist who is required to have completed his high school work, graduate in pharmacy, in a three-year course, and pass a state examination. There seems to

be little justification for continuing the assistant pharmacist arrangement in many of the states.

Following the discussion of this matter some of the states became active along legislative lines looking toward the abolishing of the grade, and during the past several years some of the states have secured legislation which enables them to discontinue issuing such licenses. Virginia recently secured such a law, after several previous unsuccessful attempts. A law was enacted by the general assembly of that state during the 1930 session which will allow the discontinuance of giving assistant examinations after March 1, 1935, and under its terms such assistants as are in good standing may be admitted to the registered pharmacist examinations until March 1, 1933. The group is small in Virginia, and this latter provision will have a tendency to further reduce the number of assistants through advancement to the pharmacist grade. Those not inclined to try for the pharmacist certificate will be allowed to continue practicing as assistants. The law does not wipe out the grade at a stroke, but before many years go by the assistant in Virginia will be a negligible consideration so far as numbers go.

HISTORIC AND INTERESTING PLACES OF BALTIMORE, THE A. PH. A. CONVENTION CITY.

An inadvertent error was made on page 172 of the February JOURNAL; the statement "Monument over the grave of Edgar Allan Poe" is correct, but the other two monuments are located elsewhere in the city and are memorials. The locations of other historic and interesting places follow:

The Johns Hopkins University Buildings—on North Charles St.; Lee House—residence of Gen. R. E. Lee (with United States Engineer Corps) during erection of Fort Carroll at entrance to Baltimore Harbor, Madison Avenue near Biddle Street; Druid Hill Park—six hundred and seventy-four acres, noted for its natural beauty; Soldiers and Sailors' Monument—Druid Hill Park, between Druid Lake and Mt. Royal Reservoir; Confederate Monument—Mt. Royal Avenue, near Lanvale; Francis Scott Key Monument—Memorial to author of "The Star-Spangled Banner," Lanvale and Eutaw Streets; Lexington Market—Baltimore's famous market, Lexington Street, from Eutaw Street to Pearl Street; Carroll Park—with colonial mansion of Charles Carroll, barrister, Monroe Street and Baltimore and Ohio Railroad; Riverside Park—formerly Fort Covington, which prevented a land attack upon Fort McHenry during bombardment in 1814, Randall and Johnson Streets; Armistead Monument—to memory of Lieut. Col. George Armistead, War of 1812–1814, Federal Hill Park; The Fire of 1904 started at Southeast corner Redwood and Liberty Streets; Congress Hall—a tablet on the wall, east side of Liberty Street, south of Baltimore Street, says: "On this site stood Old Congress Hall, in which the Continental Congress met December 20, 1776, and on December 27, 1776, conferred upon General Washington extraordinary powers for the conduct of the Revolutionary War;" Maryland Historical Society Building—historical documents, paintings, statuary, etc., cor. Park Ave. and Monument Streets; Battle, or Baltimore, Monument—erected in memory of soldiers who fell in defense of Baltimore during British attack, September 12–13, 1814, Calvert Street, between Fayette and Lexington Streets (Monument Square); Merchants' Club—Redwood Street, between Calvert and South Streets. A tablet on the west wall says: "Upon this site stood, from 1774–1786, the Lovely Lane Meeting House, in which was organized (December 1784) the Methodist Episcopal Church in the United States of America;" Wildey Monument—to Thomas Wildey, founder of first lodge of Independent Order of Odd Fellows in America, Broadway Square, near Fayette Street; Patterson Park—one of Baltimore's finest public reservations, contains breastworks erected during War of 1812, Patterson Park Avenue and Baltimore Street; Clifton Park—with the summer residence of the late Johns Hopkins, founder of university and hospital bearing his name, Harford Road and Washington Street.

THE DEPARTMENT OF THE NATIONAL ASSOCIATION OF BOARDS OF PHARMACY

President, John A. J. Funk, Galveston, Ind. J. W. Gayle, *Treasurer*, Frankfort, Ky. Chairman of Executive Committee, John Culley, Ogden, Utah. *Secretary*, H. C. Christensen, 130 N. Wells St., Chicago, Ill.

ACTIVE MEMBER STATES.

Alabama	Indiana	Montana	Rhode Island
Alaska	Iowa	Nebraska	South Carolina
Arizona	Kansas	Nevada	South Dakota
Arkansas	Kentucky	New Hampshire	Tennessee
Colorado	Louisiana	New Jersey	Texas
Connecticut	Maine	New Mexico	Utah
Delaware	Maryland	North Carolina	Vermont
D. of Columbia	Massachusetts	North Dakota	Virginia
Florida	Michigan	Ohio	Washington
Georgia	Minnesota	Oklahoma	West Virginia
Idaho	Mississippi	Oregon	Wisconsin
Illinois	Missouri	Pennsylvania	Wyoming
		Porto Rico	

COMING CONVENTIONS.

The N. A. B. P. convention promises to be both interesting and beneficial. Already the credential returns point to a record attendance, in spite of the fact that this is a short year. However, this is a good year to attend the convention. May is the best month to visit our national capital, and Baltimore and Washington are practically adjoining. The A. PH. A. meeting will be especially interesting and a ground-breaking ceremony for the Pharmacy Headquarters Building is being planned for convention week. And most important, there is also an opportunity to attend the U. S. Pharmacopœial Revision Convention to be held in Washington May 13th–14th, where the most prominent men in pharmacy and medicine will congregate. Whether you are a delegate or not, you should arrange to attend at least some of the U. S. P. meetings.

As information concerning transportation, hotels, rates, entertainment, etc., was given in a bulletin which was mailed to every member, only the business program is given here:

TENTATIVE PROGRAM OF
NATIONAL ASSOCIATION OF BOARDS OF PHARMACY, TWENTY-SEVENTH ANNUAL CONVENTION.

Hotel Emerson, Baltimore, Maryland, May 5 and 6, 1930.

MONDAY, MAY 5, 1930, AT 9:30 A.M.—*First Session.*

1. Call to Order, President John A. J. Funk.
2. Roll Call.
3. Appointment of Committee on Credentials, President Funk.
4. President's Address, John A. J. Funk.
5. Appointment of Committee on President's Address.
6. Report of Executive Committee, John Culley, Chairman.
7. Report of Secretary, H. C. Christensen.
8. Report of Treasurer, J. W. Gayle.
9. Report of Committee on Constitution and By-Laws, Chas. E. Reed, Chairman.

MONDAY, MAY 5, 1930, AT 2:00 P.M.—*Second Session.*

1. Report of Department of Post Graduate Study, R. L. Swain, Director.
2. Report of Legislative Committee, S. A. Williams, Chairman.
3. Report of Committee on Credentials.
4. Appointment of Nominating Committee.
5. Report of Advisory Examination Committee, H. C. Christensen, Chairman.
6. Report of Syllabus Committee, W. D. Jones, N. A. B. P. Chairman.
7. Report of Committee on National Legislation, R. L. Swain, Chairman.
8. Report of Committee on Pharmacy Ownership Law, Jacob Diner, Chairman.
9. Verbal reports of Vice-Presidents:
   District No. 1—C. Thurston Gilbert
   District No. 2—L. N. Richardson
   District No. 3—G. V. Kradwell
   District No. 4—F. L. Vilas
   District No. 5—S. M. Scott, Jr.
   District No. 6—C. B. Allison
   District No. 7—W. M. Hankins
   District No. 8—Jos. P. Murray
   District No. 9—Arthur L. Phelps
10. Appointment of Resolutions Committee.
11. Report of Committee on Banquet Arrangements, L. L. Walton, Chairman.

MONDAY, MAY 5, 1930, AT 6:00 P.M.—*Banquet.*

The Honorable Herbert Levy, Assistant Attorney General for the State of Maryland, will be guest of honor and will discuss a topic of special interest to board members.

TUESDAY, MAY 6, 1930, AT 9:00 A.M.—*Joint Session.*

Joint Session of National Association of Boards of Pharmacy and American Association of Colleges of Pharmacy. An interesting program is being planned.

TUESDAY, MAY 6, 1930, AT 2:00 P.M.—*Final Session.*

1. Report of Committee on President's Address.
2. Report of Advisory Publicity Committee, Roy B. Cook, Chairman.
3. Report of N. A. B. P. Committee on Prerequisite Legislation, Wm. R. Acheson, Chairman.
4. Report of Grievance Committee, H. G. Ruenzel, Chairman.
5. Report of Committee on National Certificate, H. C. Christensen.
6. Final Report of Committee on Constitution and By-Laws, Chas. E. Reed, Chairman.
7. Reports of Special Committees.
8. Unfinished Business.
9. New Business.
10. Report of Nominating Committee.
11. Election and Installation of Officers.
12. Adjournment.

DISTRICT MEETINGS.

District No. 2 held an unusually interesting meeting at the Hotel Washington, Washington, D. C., on March 24th and 25th. The sessions covered two full days and every state board in the district and every college with the exception of one or two were represented.

The broad scope covered at these meetings can be judged by glancing through the subjects on which papers were presented: "The Importance of Physiological Chemistry in Modern Professional Pharmacy"—Lloyd Riggs; "What Can Be Done to Stimulate the Practice of Professional Pharmacy?"—Willis G. Gregory; "The Need for Uniformity in the Legal Requirements for Practical Experience"—H. C. Christensen; "The Importance of Practical Pharmacy in the Training of a

Pharmacist"—Charles F. Kramer; "A Study of the Practical Pharmacy Aspects of Five Hundred Recent Prescriptions"—Augustus C. Taylor; "What Materia Medica Should Include"—H. H. Rusby; "Variations in the Number of Examination Subjects Required by State Boards of Pharmacy"—William Mansfield; "Pharmaceutical Arithmetic"—J. W. Sturmer; "The Purpose of Board Examinations from a Teacher's Point of View"—Curt P. Wimmer; "Is Latin a Dead Language in Pharmacy?"—J. Leon Lascoff; "The Problem of the Assistant Pharmacist"—Robert P. Fischelis; "The Quality of Preliminary Education as Reflected by State Board Examinations"—R. L. Quigley; "Recent Developments in Scientific Pharmacy"—Ivor Griffith.

The Committee appointed to Study Materia Medica, of which William Mansfield is chairman, delivered a very interesting report but as its findings were not finished, a further report is to be delivered at next year's meeting, which will be held at Wilmington, Delaware.

Complete minutes of the meeting are being prepared by Secretary Hugh Muldoon of the District, which will include an abstract of all the discussions as well as the papers in full. Mimeographed copies will be mailed out to each college and Board in the district, and an extra supply will be available. Anyone interested in having a copy is asked to communicate with the N. A. B. P. central office.

District No. 4.—A joint meeting of the boards and colleges of District No. 4 (Minnesota, Iowa, North Dakota, South Dakota and Nebraska) was held at the Nicollet Hotel, Minneapolis, Minn., on February 12th. Each state in the district was represented by both board and college delegates. Dean Wulling of the University of Minnesota opened the general discussion by stating the object of these district meetings and then gave a brief review of the history of pharmaceutical education and the development of board activities. He advised against standardizing the curriculum of the four-year course until such time when all colleges are on this basis. He suggested that at some future time it might be advisable to give an examination to all those desiring to enter the profession of pharmacy in order to test aptitude, etc., before the expense of a college education is entailed. Dean Lyman of Nebraska, Dean Teeters of Iowa and Dean Serles of South Dakota, expressed their views on these subjects and spoke briefly on the situation in their particular states.

Members of the Nebraska and South Dakota Boards submitted actual examination question papers for discussion and these proved interesting. The practical experience requirement, reciprocity and a number of other similar subjects were considered.

Gustav Bachmann of the University of Minnesota acted as secretary for the meeting and has mailed out mimeographed minutes of the meeting to all who were present.

District No. 5.—Acting Chairman Cook of the West Virginia Board sent out a call for a meeting at the Patrick Henry Hotel, Roanoke, Virginia, on March 27th and 28th, but the response from both colleges and boards in the District was not sufficient to warrant a meeting, therefore the call was cancelled. With the pharmacopœial and other conventions so close, an extra trip for a district meeting seemed impractical, and therefore District No. 5 is concentrating on a good attendance at the N. A. B. P. convention in Baltimore.

STATE BOARD NEWS.

Alabama.—The next examination meeting will be held in Birmingham, June 5th and 6th, at the Thomas Jefferson Hotel.

Arizona.—Arthur Lee Phelps, secretary of the Arizona Board of Pharmacy and vice-president and chairman of N. A. B. P. District No. 9, will attend the N. A. B. P. and A. PH. A. conventions in Baltimore, also the U. S. P. convention in Washington as delegate.

The April Board examination was held on the 16th instead of the 9th as originally announced, and a large class was examined.

An attempt is being made to induce the regents of the University of Arizona to establish a course in pharmacy.

Colorado.—An even hundred candidates were examined at the January meeting held in Denver; of these, twenty-five were awarded registered pharmacist licenses and twenty-nine assistant certificates.

The following were registered by reciprocity: Mrs. Violet Hames Freese and Charles R. Tucker, both of Kansas; Paul T. Mason, of Arkansas; Carl W. Wickman, of Oklahoma; William F. Walker, of Nebraska and Jennings B. McDonald, of Georgia.

Messrs. Murray and Stauffer will represent Colorado at the N. A. B. P. convention and the U. S. P. convention.

The next examination will be held in Denver on May 23rd and 24th.

Connecticut.—C. Thurston Gilbert, of Darien, has been reappointed a commissioner of pharmacy for five years to take effect June 1st. Mr. Gilbert is at present vice-president and chairman of District No. 1 (New England States) and the N. A. B. P. rejoices over the good word that he is to remain on the Connecticut Board.

Kentucky.—The Board of Pharmacy is keeping up the good work it started several months ago, by obtaining injunctions against drug stores being operated by non-registered pharmacists. For more than fifty years the law of the state has provided that non-registered owners of pharmacies must keep a registered pharmacist constantly employed. Merely fining violators was not satisfactory. With a court injunction against an owner, the orders of the court must be complied with and the Board is keeping a close watch on such stores to see that the court orders are carried out at all times.

The legislature has just passed an amendment to the pharmacy law restricting the use of words, "drug, drugs, drug store pharmacy or apothecary or any combination of such names or titles" to places conducted by registered pharmacists.

The regular quarterly meeting was held at Danville on April 8th.

Maine.—Seventeen candidates were examined at Augusta, Maine, on March 12th and of this number seven were successful in passing. Reciprocal registration was granted to Arthur W. Mussells and Ralph L. Merson, both from Massachusetts.

The annual meeting of the Maine Pharmaceutical Association will be held at Rangeley Lake House, Rangeley, Me., the last week in June.

Maryland.—By a plan which has been finally worked out, the Maryland Board will require all evidences of practical experience to be submitted when the student applies for matriculation in the college of pharmacy. A special form designated, "Preliminary Education and Practical Retail Drug Store Experience Certificate" has been adopted, and comprises a full statement of high school education and retail drug store experience. Thus all data will be available to the Board months in advance of examinations and ample time will be afforded for investigation of information submitted.

An examination meeting was held on February 10th and 11th in the new Pharmacy-Dental Building of the University of Maryland at Baltimore. There were eight applicants for full registration and twenty-five for assistant registration.

Massachusetts.—The proposed college prerequisite bill was taken up at the mid-winter meeting of the Massachusetts State Pharmaceutical Association held in Worcester, January 27th. The question was debated by four members in favor of the measure and four who were opposed, and a motion to support the bill was overwhelmingly carried.

Nebraska.—The next pharmacy examination will be given June 17th to 20th, inclusive, at the Creighton College of Pharmacy, Omaha, Nebr.

New Jersey.—Governor Morgan G. Larson has appointed James J. A. Bauman, of Ridgewood, as a member of the state board of pharmacy to succeed Harry C. Bischoff who retires on June 1st.

New Mexico.—William McAdoo, of Carlsbad, a member of the Board of Pharmacy, is also president of the New Mexico Pharmaceutical Association and will preside over the second annual convention to be held in his home town on May 19th and 20th.

North Dakota.—Following the Supreme Court decision, which was reviewed in the February Department, the attorneys for Louis Rosoff, who was denied the right to serve on the Board of Pharmacy by that decision in spite of the fact that the Governor appointed him, filed an application for a rehearing which was denied by the Supreme Court. This makes the victory of the state association final and virtually gives it the right to make appointments on the Board of Pharmacy through its recommendatory power, since the Governor has no right to appoint outside of the list submitted.

Oklahoma.—Forty applicants took examinations before the Oklahoma Board of Pharmacy on February 3rd and 4th at Oklahoma City. Out of this number, thirty-eight were successful in passing.

Dean D. B. R. Johnson, of the University of Oklahoma, reports that it has been impossible for the University to fill the demand for graduates. The thirty-two students graduating last June were placed in positions immediately. Under the new law, every store which carries any sign relating to drugs, pharmacy, etc., must be in charge of a registered pharmacist.

Ohio.—The Board of Pharmacy examined 42 applicants on January 14th and 15th, and twenty-seven of these were granted licenses. The following were granted reciprocal certificates: Wm. S. Averett, of Indiana; Hiram K. Metcalf, Carl V. Shakely, Isadore A. Bless and Louis E. Moriner, all of Pennsylvania; B. J. A. Stuntebeck, of Kentucky; Wm. J. Trevaskis, of Arkansas; Alfred W. Staples, of Oregon.

The Board reorganized by electing Ralph C. Knisely as president; A. L. Flandermeyer, vice-president and M. N. Ford, secretary.

Charles Ehlers, of Cincinnati, has been reappointed a member of the Ohio Board for a term of five years, ending March 31, 1935. This is Mr. Ehlers' third appointment.

Results on examination held April 1st and 2nd at Columbus were not available at time of going to press.

Oregon.—E. E. Magee, of Klamath Falls, was elected president of the Board at the regular meeting held February 11th, and A. E. Crosby and Frank S. Ward were reëlected treasurer and secretary, respectively.

Frank S. Ward, who is also secretary of the state pharmaceutical association, announces that body will hold its 41st annual convention at Seaside, Oregon on July 7th, 8th and 9th. Plans are being made for the most pretentious convention ever held in the state.

Virginia.—A bill to abolish the "registered assistant" grade certificate was recently passed by the House and the Senate, the latter body amending it to become effective in 1935 instead of 1933 as originally provided. Secretary Winne writes us under date of March 28th that it is now a law.

NORTH DAKOTA STATE BOARD OF PHARMACY.

The North Dakota State Board of Pharmacy will meet June 17th, 18th and 19th at the College of Pharmacy, Fargo, for the purpose of conducting examinations and transacting business. All applications and communications should be mailed to P. H. Costello, Secretary, Cooperstown, as early as possible.

NEW MEXICO PHARMACEUTICAL ASSOCIATION.

The second annual convention of the New Mexico Pharmaceutical Association will be held in Carlsbad, May 19th and 20th. Walter Cousins and Carl Weeks will be among the speakers. The Secretary is George M. Adams, of Las Cruces.

PROCEEDINGS OF THE LOCAL BRANCHES

"All papers presented to the Association and Branches shall become the property of the Association with the understanding that they are not to be published in any other publication prior to their publication in those of the Association, except with the consent of the Council." —Part of Chapter VI, Article VI of the By-Laws.

ARTICLE III of Chapter VII reads: "The objects and aims of local branches of this Association shall be the same as set forth in ARTICLE I of the Constitution of this body, *and the acts of local branches shall in no way commit or bind this Association, and can only serve as recommendations to it.* And no local branch shall enact any article of Constitution or By-Law to conflict with the Constitution or By-Laws of this Association."

ARTICLE IV of Chapter VII reads: "Each local branch having not less than 50 dues-paid members of the Association, holding not less than six meetings annually with an attendance of not less than 9 members at each meeting, and the proceedings of which shall have been submitted to the JOURNAL for publication, may elect one representative to the House of Delegates."

Reports of the meetings of the Local Branches shall be mailed to the Editor on the day following the meeting, if possible. Minutes should be typewritten, with wide spaces between the lines. Care should be taken to give proper names correctly and manuscript should be signed by the reporter.

BALTIMORE.

The Faculty of the School of Pharmacy of the University of Maryland received the members of the Baltimore Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION and their friends at the new building of the School of Pharmacy on Friday evening, March 28, 1930.

The visitors assembled in the spacious reading room of the library. Small groups of eight or ten were formed, and these groups were escorted through the building by the different members of the faculty.

The dispensing and manufacturing pharmacy laboratories were first inspected. The older graduates of the Maryland College of Pharmacy were especially interested in the electrically driven grinders, mixers, mills, collapsible tube filler, tablet machine, sugar coating pans, etc., in these laboratories, and made many references to the differences between the present-day equipment and the hand methods employed during their apprenticeship and college days.

Then the visitors were taken to the fifth floor and shown the zoölogy, bacteriology and pharmacological laboratories, with the latest improved equipment and accessories. Descending, the groups leisurely investigated the class rooms, the inorganic and organic chemistry laboratories, the pharmaceutical chemistry and research laboratories, as well as the physics laboratory. Of special interest was the new commercial pharmacy laboratory, with its beautifully constructed drug store equipment. Here exhibits from the different manufacturers were displayed.

Next, President Frank L. Black, in true school manner, called the large class of the Baltimore Branch to order in one of the class rooms, admonished one or two who were tardy, and called on Dr. A. G. DuMez to deliver the lecture.

Dr. DuMez welcomed the visitors, and then made use of one of the new balopticons in presenting pictures of several unusual paintings, some on canvas and others on glass, idealizing the calling of pharmacy by depicting Christ as an Apothecary. Dr. DuMez explained the texts and symbols inscribed on each picture as presented, and called attention to the similarity in the treatment of the subject matter by the different artists. He stated that several of the paintings were executed centuries ago, and that two of the finest on glass are now exhibited in the National Apothecary Shop of the Swiss National Museum at Zurich.

Class was dismissed, and the guests were invited to enjoy the refreshments provided for the occasion.

The visiting members of the Baltimore branch included several of the older graduates of the Maryland College of Pharmacy: Robert S. McKinney, of Taneytown, Md., Class of 1882; Charles E. Sonnenburg, Class of 1890; Charles Morgan, Class of 1891; J. W. Dorman, Class of 1894; W. G. Boucsein, Class of 1895 and Judson H. Sencindiver, Class of 1897, and all

expressed pleasure in again attending class in the new college building.

B. OLIVE COLE, *Secretary-Treasurer.*

CHICAGO.

The 189th meeting of the Chicago Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held at the University of Illinois School of Pharmacy, March 18th, President Hynes presiding. After a report of the attendance of the last meeting was read, H. M. Emig, instructor at the University of Illinois School of Pharmacy, gave a résumé of the January and February Journals. Following this, a welcome was extended to Dean Lofgren, Dr. Harwood and seven students from Valparaiso University who came to Chicago for the meeting. Dr. Bernard Fantus, the speaker of the evening, was then introduced, and he gave an interesting talk on U. S. P. and N. F. Revision.

U. S. P. AND N. F. REVISION.[1]

"On the 13th of May at the Willard Hotel in Washington, D. C., the delegates from the institutions who have a right to representation will meet for the Pharmacopœial Convention. Principles will be formulated for the guidance of the Revision Committee and the Nominating Committee will be formed. In the evening of the same day the Nominating Committee will meet in lively session to select the Revision Committee. An exciting meeting is expected, due to the differences in opinions between pharmacists and physicians on what shall be admitted into the U. S. P. History of former committees shows that the physicians seemed to know better what articles should be included, but after the sub-committee on scope, which included 17 physicians, had labored hard and long on deletions and admissions, the pharmacists present threw back into the U. S. P. all those articles deleted by the committee. Now the physicians demand the right to delete and admit articles, but this is not altogether satisfactory. We must be liberal enough and the physicians' demand for last word on scope should be withdrawn. In case of dispute, the matter should be submitted to the General Committee, where a two-thirds vote should be required to over-ride the work of the Committee on Scope. Nevertheless, the use of a substance should not dictate admission into the U. S. P. The effect of a drug is what interests the physician. He wants to know the *best* drug of any one type for a certain effect. There may be half a dozen drugs which are similar in action, but he wishes to select the *one* of that group. If the Committee on Scope furnishes that information, it yields invaluable service; otherwise its value as a committee is not great. For example—which of the strychnine salts official is the better, the sulphate or the nitrate? Both give the same general results, but if one is better, why have the other official? The pharmacist will immediately say that the sulphate is used a great deal, so it should be official even though the nitrate is the better salt. In all probability the sulphate is used so much because at one time it was the only official salt of strychnine. The Pharmacopœia's recognition of it makes for its use and does not help in the clarifying of that book. A line must be drawn somewhere. The question is, "Should that line be drawn from a liberal or more strict viewpoint?" Some say that if a physician prescribes brick dust, then that should be official. If literal action were taken in this case it would certainly detract from the utility of the U. S. P., both for physicians and pharmacists. While it is not a textbook, it is a book of guidance and is used for state board examinations to a great degree. The examiners think that if a thing is official the applicant for the examination should know all about it. Cut down the articles until each one is a true working tool of the physician. There are about fifty local anæsthetics. Why have so many? Cut down the number to a few, each one having a special mission. For example—when an anæsthetic is discovered to take the place of cocaine, drop cocaine from the U. S. P. It is one of the most terrible anæsthetics that we have, anyway, but at present there is nothing to take its place. We must have standards for medicines used, but why not do as the French do? In France, if an article is dropped, the last "Codex" in which that article was official still sets the standard for it. Thereby in a way, all things that were official at any time are still official. We could do the same with the U. S. P. If this is done, a more dignified guide to therapy will result and the U. S. P. will shine in the light of pure science.[2]

"There is a tendency to delete articles of a complex nature. This may or may not be a good thing. A preparation should be as simple

[1] An address by Bernard Fantus, M.D.

[2] Dr. Fantus then presented a list of articles which he thought should be considered for admission in the U. S. P. XI.

as possible, but if there is a real necessity for having several ingredients in it, good and well. The trouble with most complex mixtures is that they are not scientific, not elaborated, each ingredient has not been tested for its particular function. Is the proportion of each ingredient correct? Is the combination the best that can be had? Some relics that are examples of incorrect mixtures are Paregoric and Brown Mixture. If a complex mixture has the therapeutic action given and expected of it, then by all means admit it into the U. S. P. The pharmacists say that their needs dictate that standards for complex preparations must be met. Here is where the N. F. enters. It was designed for that purpose by a group of pharmacists who saw the necessity for having such a book of formulas. Place preparations in it and let the same suggestion about having the U. S. P. official in series apply to it also.

"Why not have modernized spelling in the U. S. P.? Why is the word Pharmacopœia spelled the way it is? Why not end it "pea"? Why must the name of an alkaloid end in the letter *e*? The modernizing of spelling must be a gradual advancement. The authority for spelling words should be vested in the body which uses those words mostly. In this particular case, if the Revision Committee accepts that spelling of a word, then we as pharmacists and physicians should accept that spelling as final. The word mixture, meaning a turbid mixture (as a class of preparations) is the wrong title to use. Why not call that class Suspensions? The British Pharmacopœia is now in the process of being revised and the Secretary of the Commission (which is a governmental body) has asked the U. S. P. Revision Committee to coöperate with them in naming the new articles admitted at this time.

"The improvements which are to be made may be divided into two classes: (1) those forced upon us and (2) those which we find by investigation. In the latter we will find a great deal of help by using colloidal chemistry. For instance—bichloride of mercury may be reduced to free mercury by the use of formaldehyde. If investigation shows that this is a better method for obtaining preparations containing free mercury, such as the ointment, make this method for preparation of the ointment official. It makes no difference whether or not this can be prepared in a drug store if a *better* ointment will be the result. Another thing which should be observed is to get the sameness of color for a preparation when it is made at different times. Syrups, particularly Syrup of Orange, fall in this class. One time it will be almost water-white and another time it will be quite orange in color. Storing in amber-colored bottles may aid in bringing about this. Another suggestion—why not have our dilute acids $N/1$ as advocated by the British? This latter is also applicable to solutions of NaOH and KOH.

"The psychic value of some substances retains their use for some time, but they are bound to have their ups and downs. An example of such a substance is yeast. While its value medicinally is not great, it does have some popularity for some time. Then it drops into disuse and again some time later it appears as something new in the treatment of illnesses. Advertising also plays an important part in the usage of a substance. The commissioners should investigate advertised preparations and, when the advertisements are discontinued, if the medicaments are of real value their use will continue, but if they are not efficient they will drop from the market.

THE NATIONAL FORMULARY.

"The National Formulary should be as dignified and as useful as the U. S. P., but as yet it has not come into its own. In this book the admissions are dictated by use as it represents the pharmacist's point of view, not the idea of the physician which is represented by the U. S. P. where outstanding therapeutics and utility are the necessary qualifications for admission. The AMERICAN PHARMACEUTICAL ASSOCIATION should set aside a sum of money for the study of the *use* of medicaments throughout the United States. This investigation should not be left to those who wish to work for the good of pharmacy, donating their time to that end, but it should be undertaken by a paid officer and staff who could investigate and statisticate the degree to which preparations are being used. This information should be available before the Revision Committee meets and would be a basis for their work on scope. The usage of things is not the only thing which should dictate admission into the N. F. There are many things, not official to the U. S. P., which *should* be used, but are not and the N. F. Revision Committee has the privilege to include this group when selecting articles. An example may be found in syrups and elixirs. These should be elegant preparations and a set of formulas along this line would be a revelation to the physicians. The best propa-

ganda along this line is to be found in convincing the teachers in the medical schools that the N. F. does contain this long-wished-for set of recipes. They, in turn, can broadcast this valuable information to their classes.

"Some of the N. F. preparations need 'debuncoizing.' Such preparations as Warburg's Tincture contain many ingredients not necessary to their therapeutic value. Such preparations should be investigated scientifically before allowing them to continue as articles in the N. F. and the suggestion is made that the wholesale manufacturers' organizations appoint a body to look into this matter, thus saving themselves money in the end."

Following the address, a general discussion took place, many present taking part, each one offering some suggestion on improvement in the U. S. P. XI.

President Hynes expressed his wish to see statements relative to the preservation of drugs from the attacks of insects contained in the information following the definitions of those drugs rather than a general statement in the front of the Pharmacopœia where those uncertain instructions are seldom observed by the Pharmacist. Also in testing calomel, the U. S. P. X states that the precipitant used is nitric acid, which should be changed to silver nitrate solution. Objection is offered to the using of words (in the U. S. P.) which cannot be found in a good dictionary. Why is there not a test for "chlorides" as impurities of "iodides" and "bromides?" Sodium chloride is a logical, cheap adulterant which might be used in both classes of salts.

Mr. Gray objects to the change in strength of Lugol's Solution produced when the formula was changed from a weight to a volume preparation.

Dean Day approved Dr. Fantus' idea on modified spelling, but hestitated to agree that affiliation with the British, who use the spelling "labour," would aid in bringing about any simplification. He also stated that the U. S. P. Revision Committee has money from the publication of the U. S. P. which has yielded enough interest so that for the last four years about $20,000 has been spent for research work. The N. F. is not so fortunate, but there is a smaller sum set aside for research work.

Professor Gathercoal stated that this year there will be $1000 used for research work on N. F. problems.

Mr. Becker objects to the weight of water as stated in the U. S. P. where it is weighed at 4° C. *in vacuo*, and this weight used as a standard, although under ordinary circumstances we do not weigh or measure *in vacuo*. Mr. Webster pointed out that a correction is made for this, but why have the correction rather than the weight under the conditions that are practical?

Dean Lofgren expressed the pleasure of the Valparaiso group in being able to attend the meeting, especially so inasmuch as it has been several years since a representation from that school had attended a branch meeting in Chicago.

Mr. Webster objected to simplified spelling if it applies only to a part of the English used in the U. S. P. Why spell *sulphuric* with the letter "f" replacing the "ph" and not use the same logic in spelling phosphoric.

Mr. Rylands, of Armour Co., suggested that such additions as metaphen be considered as articles for the U. S. P. XI, and also referred to the work done by N. N. R.

Dr. Volwiler, of Abbott Laboratories, discussed the power of admitting articles that are sold as proprietaries, and preparations on which the patents had expired. He also suggested the following additions: Parathyroid, iodized or brominized oils, female sex hormone and antivennin.

Messrs. Webster and Becker agree that the proposed addition of sodium sulphocyanate may be taken care of by making official potassium sulphocyanate which is now "official" as a test solution.

Messrs. Handler and Dobin suggest that more care be used in selecting synonyms for the articles present, bringing special attention to the proposed addition of "sweet oil" as a synonym for olive oil and "Huxham's Tincture" for compound tincture of cinchona.

Dr. J. T. Sperl has several suggestions as additions for the new U. S. P. Give intravenous doses for the following: Antimony and Potassium Tartrate, gr. $^3/_4$; Emetine Hydrochloride, gr. $^1/_2$; Sodium Cacodylate, gr. $7^1/_2$; Sodium Iodide, gr. $7^1/_2$; Red Iodide of Mercury, gr. $2^1/_2$; Glucose, dr. $2^1/_2$; and Sodium Salicylate gr. 15. He also suggests that Sodium Acid Phosphate (Mono-Sodium Orthophosphate) be added and given an average dose of dr. 1. He suggests further that cacao butter suppositories can be made more plastic and cohesive by using the following formula: Hydrous Wool Fat 1.0, Starch 4.0,

Cacao Butter *q.s.* 30.0. Rub together the wool fat and starch and then incorporate the cacao butter. He asks, "Should Syr. of Ferrous Iodide be kept in the light or dark?" Hyoscyamus should be from one-year old plants. Digitalis should be from the plant in flower during the second year. Under the description and physical properties of "Olsum Chenopodii" one should find that it darkens and thickens with age. Lastly he offers a Glycerite of Elm as a new preparation to be used as a vehicle for iodides and creosote.

Following this discussion a rising vote of thanks was given Dr. Fantus.

LEWIS E. MARTIN, *Secretary.*

CHICAGO BRANCH FURTHER POPULARIZES JOURNAL OF THE A. PH. A.

Realizing that many pharmacists—retail, manufacturing, and teachers—do not get all of the good reading out of the JOURNAL that is in it, the Chicago Branch has undertaken a means of pointing out to them the many interesting topics which might otherwise be overlooked. At the March meeting of the Chicago Branch, H. M. Emig, Instructor at the University of Illinois School of Pharmacy, gave a 20-minute résumé of the January and February JOURNALS. Inasmuch as two JOURNALS had to be covered at this meeting only the scientific articles were abstracted, but in future meetings the whole JOURNAL will be "gone over," the "high lights" being pointed out, so that the pharmacists can then read and digest the articles in detail. We hope that this will prove beneficial to A. PH. A. members and that they will be able to get even more out of the JOURNAL in the future.

LEWIS E. MARTIN, *Secretary.*

DETROIT.

The March meeting of the Detroit Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held in the Y. M. C. A. Building, Thursday, March 13th; dinner preceded the meeting. In the absence of President Koelzer, Vice-President Jack Webster, of the University of Michigan, called the meeting to order; about sixty pharmacy students were present from the University of Michigan, Detroit Technical Institute and the College of City of Detroit.

Leonard A. Seltzer was asked to preside in recognition of being the father of the "Student Night" idea. Dr. Seltzer thanked the students for the honor, assuring them the Detroit Branch is glad to have them at all meetings.

The minutes of the previous meeting were read and approved. Chairman Lakey, of the Program Committee, reported that the April meeting would be given over to a scientific subject of interest to Pharmacy, by L. W. Rowe.

The Student Program was opened by James Liddell of the College of City of Detroit. He presented a most interesting paper on "The Materia Medica of the American Indian."

J. B. Juntenen, of the Detroit Technical Institute, chose as his subject "U. S. P. Preparations and Their Use in Prescription Writing." He said physicians are becoming modernistic. George Stanley, of the Detroit Technical Institute, answered Mr. Juntenen in a well-written paper entitled "Opinion on Remedy for Modernistic Prescription Writing."

Olga Kravchell, of the College of City of Detroit, presented a most unusual and complete paper entitled "Pharmacists Awakening to the Necessity of Uplifting the Profession." Miss Kravchell deplored the present condition of many drug stores, enumerating the evils which tend to lower the profession; she stressed the necessity of education.

Thelma Beaubien, of the City College, presented a most cheerful paper entitled "Yours Is the World and Everything That Is in It." Rex Green of the U. of M. gave an interesting talk on "The Future of Pharmacy." Fred Bessancon, of the Detroit Technical Institute, followed with a splendid paper, bringing out an entirely new phase of pharmacy of the future in a discussion of "The Manufacturer and Possibility of Experience." Harold Heyn, of the College of City of Detroit, presented a paper "What Is the Future of the Student Pharmacist?"

Jack Webster, of the University of Michigan, gave a splendid talk on "Meeting the Demands on Pharmacy To-day." He gave a very optimistic view to the students, suggesting they use education to better advantage by assisting the physician in his problems.

J. H. Webster complimented the students on their efforts in preparing such splendid papers, all with the same view—that is, raising the standard of the profession. He encouraged the students and assured them the future outlook in pharmacy is much brighter than the past.

The student program being completed, Mr. Seltzer turned the chair over to Vice-President

Webster, Jr. He announced the death of Harry B. Mason, one of the organizers of the Detroit Branch and the writer of the by-laws, and moved that a suitable resolution be drawn up and sent to the family of the deceased member; the motion was supported by Dean Lakey and carried.

Leonard A. Seltzer presented a paper, by title, which will appear in the *D. R. D. A. Journal*, "We Do Not Substitute—or Do We?"

BERNARD A. BIALK, *Secretary.*

NEW YORK.

The March meeting of the New York Branch of the AMERICAN PHARMACEUTICAL ASSOCIATION was held at the College of Pharmacy, Columbia University, on Monday, the 10th; over 80 members were present and the chair was taken by President Robert R. Gerstner.

In opening the meeting, the President announced that, owing to illness, the Secretary was unable to be present and so no minutes of the previous meeting would be read; he requested Dr. Schaefer to act as secretary.

The Treasurer submitted a report on the standing of the Branch finances; this was ordered accepted.

Dr. Schaefer presented the applications for membership, in the parent organization as well as the Branch, of Messrs. Harry F. Wagner, Edward Neimeth and Charles Doessereck. These applications were approved.

It was moved, seconded and carried that a sum of Fifty Dollars be appropriated for the use of the committee opposing the so-called Druggists' Bill. Also that three delegates be appointed to represent the Branch at the hearings in connection with this Bill. President Gerstner appointed for this purpose Messrs. Lehman, Miller and Walter.

Chairman Lehman, of the Committee on Education and Legislation, reported at length the present standing and chances of the Bill.

The President asked for an expression of opinion as to whether the dinners preceding the meeting should be continued or not. A large number of members present signified their desire to continue this feature but to invite the ladies also to attend.

Chairman Dyer, of the Committee on the Progress of Pharmacy, read a number of very interesting abstracts of current chemical literature.

President Gerstner then introduced the speaker of the evening, Prof. E. Fullerton Cook, Chairman of the U. S. P. X Revision Committee, who delivered an address on pharmacopœial revision, taking as his title "The Pharmacopœia at Work."

This was followed by short talks by members of the U. S. P. Revision Committee, Messrs. Arny, Newcomb and Nitardy discussing various phases of U. S. P. revision. A general discussion then followed in which members Raubenheimer, Mayer, Currens, Bonisteel, Hessler and Schaefer participated.

A rising vote of thanks was given the speakers.

HUGO H. SCHAEFER, *Acting Secretary.*

THE REMINGTON HONOR MEDALIST.

Dr. Edward Kremers, Director of the Course in Pharmacy at the University of Wisconsin, has been voted the Remington Honor Medal for 1930.

Among the services which have prompted the members of the Committee of Awards, consisting of the Ex-Presidents of the AMERICAN PHARMACEUTICAL ASSOCIATION, in making the selection, are the following:

For his distinguished services to pharmaceutical education, his attainments in research and his promotion of interest in the history of pharmacy; his research, including that of historical pharmacy and encouragement of others to engage in research; his work in connection with that of the Wisconsin Pharmaceutical Experiment Station; his constant watchfulness for the interests of pharmacy; for the splendid work he has done through many years for professional pharmacy and for the promotion of graduate work in pharmacy at the University of Wisconsin.

Dr. Kremers was born in Milwaukee, February 23, 1865. He graduated at the University of Wisconsin, in 1886, and two years later earned the B.S. degree. He studied at the University of Goettingen and received the degree of Ph.D. in 1890. He was elected instructor in pharmacy at the University of Wisconsin in 1890, then professor of Pharmaceutical Chemistry and, in 1892, director of the Course in Pharmacy. For a number of years he was editor of the *Pharmaceutical Review;* co-editor of the "Standard National Dispensatory; Author of the English edition of Gildemeister-Hoffmann-Kremers, "The Volatile Oils." He was member of the U. S. P. Revision Committee 1900–1910.

The Remington Honor Medal will be presented to Dr. Kremers at the banquet of the AMERICAN PHARMACEUTICAL ASSOCIATION on the evening of May 6th in Baltimore.

EDITORIAL NOTES

Editor: E. G. EBERLE, 10 West Chase Street, Baltimore, Md.

Members of the Council, A. PH. A.: S. L. HILTON, *Chairman;* CHARLES H. LAWALL, *Vice-Chairman;* E. F. KELLY, *Secretary;* H. V. ARNY, A. G. DUMEZ, H. A. B. DUNNING, H. C. CHRISTENSEN, C. E. CASPARI, J. H. BEAL, W. BRUCE PHILIP, T. J. BRADLEY. *Ex-Officio Members:* D. F. JONES, *President;* A. L. I. WINNE, W. B. GOODYEAR, *Vice-Presidents;* C. W. HOLTON, *Treasurer;* E. G. EBERLE, *Editor of the Journal;* A. G. DUMEZ, *Editor of the Year Book;* R. L. SWAIN, *Chairman of the House of Delegates.*

Collaborators: The Members of the Council; E. FULLERTON COOK, *Chairman,* U. S. P. Revision Committee; E. N. GATHERCOAL, *Chairman,* N. F. Revision Committee; Chairmen of the Sections, A. PH. A.; H. A. LANGENHAN, GLENN L. JENKINS, H. C. NEWTON, DENNY BRANN, GEORGE D. BEAL; A. G. DUMEZ, *President,* A. A. C. P.; CHARLES B. JORDAN, *Chairman,* Executive Committee, A. A. C. P.; JOHN A. J. FUNK, *President,* N. A. B. P.; HENRY C. CHRISTENSEN, *Secretary,* N. A. B. P.

NEW AND NONOFFICIAL REMEDIES.

THE FOLLOWING ADDITIONAL ARTICLES HAVE BEEN ACCEPTED AS CONFORMING TO THE RULES OF THE COUNCIL ON PHARMACY AND CHEMISTRY OF THE AMERICAN MEDICAL ASSOCIATION FOR ADMISSION TO NEW AND NONOFFICIAL REMEDIES. A COPY OF THE RULES ON WHICH THE COUNCIL BASES ITS ACTION WILL BE SENT ON APPLICATION.

W. A. PUCKNER, *Secretary.*

CALCIUM GLUCONATE-SANDOZ.—Normal Calcium Gluconate.—Calcium salt of hexapentol-(2,3,4,5,6)-Acid-(1).—Calcium salt of $\alpha\ \beta\ \gamma\ \delta\ \epsilon$ pentoxy-pentane-carbonic acid.—$[HOCH_2CH(OH)CH(OH)\ CH\ (OH)\ CH(OH)\text{-}COO]_2Ca.H_2O$. It contains calcium equivalent to not less than 12.40 nor more than 12.80 per cent of calcium oxide.

Actions and Uses.—Calcium gluconate-Sandoz is used to obtain the therapeutic effects of calcium. It is more palatable than calcium chloride for oral administration and for hypodermic or intramuscular use is nonirritant.

Dosage.—Orally, for adults, 5 Gm. (75 grains) three times a day; for children, 2 Gm. (30 grains) three times a day. Intramuscularly or intravenously, for adults, 1 Gm. administered every day, on alternate days or every third day; for children, 0.2 to 0.5 Gm. administered every day, on alternate days or every third day.

Manufactured by the Sandoz Chemical Works, Basle, Switzerland (E. Fougera, Inc., New York, distributor). U. S. patent 1,648,368.

Ampules Calcium Gluconate-Sandoz.—Each ampule contains 10 cc. of a 10 per cent stabilized supersaturated solution of calcium gluconate-Sandoz.

Calcium gluconate-Sandoz occurs as white, odorless and tasteless granules, consisting of fine needle crystals. It crystallizes from an aqueous solution with one molecule of water and has the formula $(C_6H_{11}O_7)_2Ca.H_2O$. It loses completely its water of crystallization only after prolonged drying in a high vacuum at 105 C. A 3 per cent aqueous solution is slightly dextrorotatory. When heated it swells up, and during carbonization emits an odor of burning filter paper. It is soluble in cold water (1 in 30); soluble in boiling water (1 in 4 to 5), crystallizing on cooling. It possesses distinct tendencies to form supersaturated solutions. It is insoluble in alcohol and fat solvents. Cold, saturated aqueous solutions are neutral to litmus paper. Addition of diluted sulphuric acid to a 3 per cent aqueous solution causes only incomplete precipitation of the calcium sulphate, even on heating.

Dissolve 1 Gm. of calcium gluconate-Sandoz in 10 cc. of water; add 2 cc. of ammonia water and 5 cc. of ammonium oxalate: an immediate precipitation, which readily deposits on heating, results (*calcium*). To 1 cc. of a 10 per cent aqueous solution add 1 drop of ferric chloride: a canary yellow color is obtained (*α-oxyacid*). To 5 cc. of a 10 per cent aqueous solution add 0.65 cc. of glacial acetic acid and 1 cc. of phenylhydrazine (fresh) and heat the mixture on a steam bath for thirty minutes; allow to cool, and scratch the sides of the tube for a few seconds with a glass rod: a crystalline deposit of gluconic-acid-phenylhydrazide is formed. Filter the crystalline mass, and purify by dissolving in 10 to 15 cc. of hot water; add a small amount of charcoal and filter; allow the filtrate to cool: pure white crystals melting with decomposition at 200 to 202 C. are obtained.

To 5 cc. of a 3 per cent aqueous solution of calcium gluconate-Sandoz add 5 drops of nitric acid and 1 cc. of silver nitrate: not more than a slight opalescence appears (*chloride*). To 5 cc. of a 3 per cent aqueous solution add 2 cc. of alkaline cupric tartrate solution and boil: no reduction takes place (*glucose*). To 5 cc. of a 3 per cent aqueous solution add 5 drops of diluted hydrochloric acid and 1 cc. of barium chloride solution: no turbidity appears (*sulphate*). An aqueous solution meets the requirements of the U. S. P. tests for the absence of heavy metals (see U. S. P. X, p. 439).

Transfer about 0.2 Gm. of calcium gluconate-Sandoz, accurately weighed, to a large platinum crucible and moisten with 3 drops of olive oil; heat slowly and after carbonization heat the residue at red heat in an electric muffle furnace until it is completely white; bring the residue to constant weight: the residue represents not less than 12.4 nor more than 12.8 per cent of calcium oxide.

ACNE BACILLUS VACCINE (See New and Nonofficial Remedies, 1929, p. 369).

Hollister-Stier Laboratories, Spokane, Washington.

Acne Bacillus Vaccine.—A suspension of killed acne bacilli in physiological solution of sodium chloride containing 0.3 per cent of cresol as preservative. Marketed in packages of one 5-cc. vial, each cubic centimeter containing 200 million killed bacteria; in packages of one 20-cc. vial, each cubic centimeter containing 200 million killed bacteria.

PERTUSSIS BACILLUS VACCINE (See New and Nonofficial Remedies, 1929, p. 371).

Hollister-Stier Laboratories, Spokane, Washington.

Pertussis Bacillus Vaccine.—A suspension of several strains of killed pertussis bacilli in physiological solution of sodium chloride containing 0.3 per cent of cresol as preservative. Marketed in packages of one 5-cc. vial, each cubic centimeter containing 2000 million killed bacteria; in packages of one 20-cc. vial, each cubic centimeter containing 2000 million killed bacteria.

STAPHYLOCOCCUS VACCINE (See New and Nonofficial Remedies, 1929, p. 375).

Hollister-Stier Laboratories, Spokane, Washington.

Staphylococcus Vaccine (Aureus and Albus).—A suspension of killed *Staphylococcus aureus* and *albus* in equal proportions, in physiological solution of sodium chloride containing 0.3 per cent of cresol as preservative. Marketed in packages of one 5-cc. vial, each cubic centimeter containing 1000 million killed bacteria; in packages of one 20-cc. vial, each cubic centimeter containing 1000 million killed bacteria.

TYPHOID VACCINE (See New and Nonofficial Remedies, 1929, p. 378).

Hollister-Stier Laboratories, Spokane, Washington.

Typhoid-Paratyphoid Vaccine (Prophylactic).—A suspension of killed typhoid, paratyphoid A, and paratyphoid B bacilli in physiological solution of sodium chloride containing 0.3 per cent of cresol as preservative. Marketed in packages of one 5-cc. vial, each cubic centimeter containing 1000 million killed typhoid bacilli and 500 million each of killed paratyphoid A and B bacilli; in packages of one 20-cc. vial, each cubic centimeter containing 1000 million killed typhoid bacilli and 500 million each of killed paratyphoid A and B bacilli.—*Jour. A. M. A.*, October 5, 1929.

CHINIOFON.—Sodium - iodoxyquinolinesulphonate.—A mixture prepared from approximately four parts of 7-iodo-8-hydroxyquinoline-5-sulphonic acid, containing not less than 26.5 per cent of combined iodine, and 1 part of sodium bicarbonate. After preparation there is generally some chemical reaction, so that the product may contain a small amount of sodium iodohydroxyquinolinesulphonate in addition to the sodium bicarbonate and the uncombined iodohydroxyquinolinesulphonic acid. On dissolving the product in water, 100 parts of chiniofon yield approximately 85 parts of sodium iodohydroxyquinolinesulphonate.

Action and Uses.—Chiniofon, which is closely similar to preparations introduced under various proprietary names as wound antiseptics, has been found to be of use in the treatment of amebic dysentery. It is claimed that the action of the drug is probably due to its absorption and direct action through the blood stream on the amebas invading the bowel wall. The drug has been reported in some cases to produce diarrhea; but serious toxic effects do not appear to be common.

Dosage.—Orally, for adults, from 0.25 to 1.0 Gm. (4 to 15 grains) in the form of pills, cachets or solution, three times daily; for children, according to age; rectally, 1 to 5 Gm. (15 to 75 grains) freshly dissolved in 200 cc. of water at a temperature not exceeding 44 C. The course of treatment requires from seven to fourteen days. Combined oral and rectal administration has been used in acute cases and in the more serious chronic cases accompanied by obstinate clinical symptoms. It has been pointed out that the iodine content of chiniofon should be considered when chronic endamebiasis is accompanied by thyroid disturbance.

Chiniofon appears as a canary-yellow powder with no odor, or only faint odor, and possessing a bitter taste, but leaving later a distinctly sweetish aftertaste. It dissolves in water with effervescence due to the reaction of the uncombined sodium bicarbonate and iodohydroxyquinolinesulphonic acid. The sodium salt is soluble in water to the extent of about 4 per cent; is insoluble in alcohol, ether, chloroform and most of the organic solvents. Chiniofon is decomposed at 223 C.; a solution of chiniofon decomposes on boiling. The addition of strong acids changes the color to pale green and liberates free iodohydroxyquinolinesulphonic acid. To 10 cc. of the solution of chiniofon 1 per cent add five drops of ferric chloride solution: a deep emerald-green color forms. To 10 cc. of chiniofon solution 1 per cent add 5 cc. of copper sulphate solution: a dense white precipitate forms. Agitate 5 cc. of aqueous solution of chiniofon 1 per cent made slightly acid with diluted hydrochloric acid with 5 cc. of chloroform: no violet color appears in the chloroform (*iodine*). Acidify 5 cc. of a solution of chiniofon 1 per cent with hydrochloric acid, underlay with chloroform, and add one drop of sodium nitrite solution: the chloroform assumes the characteristic iodine color. To 5 cc. of a solution of chiniofon 1 per cent add 1 cc. of diluted nitric acid and 1 cc. of silver nitrate solution: a faint opalescence is apparent.

To about 1.5 Gm. of chiniofon accurately weighed into a small beaker add all at once and with rapid rotation 15 cc. of a solution of 10 cc. diethylamine in 90 cc. of anhydrous methyl alcohol. Decant the solution from the insoluble material onto a small filter moistened with anhydrous methyl alcohol. Collect the clear filtrate and subsequent washings in a porcelain dish of about 200 cc. capacity. Wash the precipitate, beaker, filter and funnel carefully with anhydrous alcohol until no trace of color is imparted to the alcohol. Allow the surplus alcohol to evaporate from the beaker and funnel, add 25 cc. of distilled water to the beaker, pass the solution through the funnel collecting the filtrate in a 250-cc. flask. Wash the beaker and funnel with separate small portions of water until all bicarbonate is dissolved; add to the solution methyl orange and titrate the bicarbonate with tenth-normal acid. The volume of tenth-normal acid used should indicate not less than 18 per cent sodium bicarbonate nor more than 22 per cent sodium bicarbonate.

To about 0.200 Gm. of chiniofon accurately weighed into a 35-cc. nickel crucible, add about 3 Gm. of anhydrous sodium carbonate. Moisten the mixture thoroughly with water, fill the crucible about three-fourths full with anhydrous sodium carbonate and apply the heat of a Bunsen burner. Heat carefully at first to avoid loss and finally to dull redness for five minutes. Allow the mixture to cool, place the crucible with contents in a 250-cc. beaker and add about 50 cc. of distilled water. When the mass is well disintegrated, pass the solution through as well-wetted filter and collect the filtrate in a 500-cc. flask. Wash the crucible, beaker, funnel, etc., well with small portions of distilled water until the filtrate is neutral to litmus paper. Heat the clear filtrate to near 100 C.; add potassium permanganate solution until a permanent purple color remains even after two or three minutes' heating. Add to the hot mixture a few drops of ethyl alcohol to remove the purple color and filter the hot liquid collecting the filtrate in a 500-cc.

flask. Wash the precipitate, filter, etc., until the washings are neutral to litmus paper, cool the solution and add sulphuric acid to distinct acid reaction, taking care to avoid loss from effervescence. To the acid liquid add a solution of 2 Gm. of potassium iodide, free from iodate, and titrate the liberated iodine with tenth-normal sodium thiosulphate solution. The volume of tenth-normal sodium thiosulphate used should indicate not less than 26.5 per cent iodine, nor more than 28.9 per cent iodine.

BACILLUS ACIDOPHILUS CULTURE-HOLLISTER-STIER.—A pure culture of *B. acidophilus* in bottles, each containing 200 cc. It contains not less than 150 million viable organisms (*B. acidophilus*) per cubic centimeter at the time of issue.

Actions and Uses.—See Lactic Acid-Producing Organisms and Preparations (New and Nonofficial Remedies, 1929, p. 220).

Dosage.—From 15 to 30 cc. in milk or water to which has been added a suitable quantity of lactose, three times daily. Each bottle bears an expiration date.

Manufactured by the Hollister-Stier Laboratories, Spokane, Wash. No U. S. patent or trademark.—*Jour. A. M. A.*, October 26, 1929.

ASSOCIATION PROGRESS.

The unwisdom of selfish exclusiveness is becoming more and more apparent to pharmacists. They are realizing more and more that their success is in the promotion of pharmacy; they have come to see that their interests are identical with those of others engaged in the drug business, of which pharmacy is the foundation. They are becoming aware that they are affected by general influences bearing upon pharmacy and that their problems can be solved only through coöperative effort. It is through a realization of and putting into practice the underlying principles of organization they can hope for success; helpfulness is the ideal of both professional and trade organizations.

CHAIN STORE STUDY.

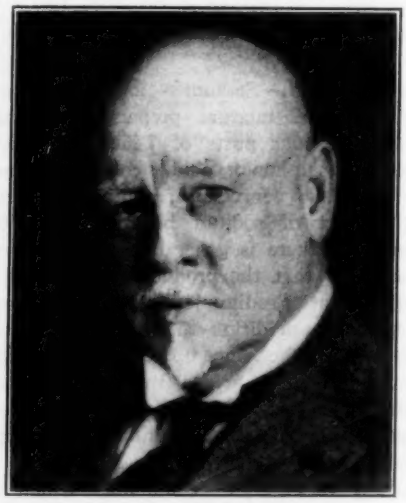
In the chain store inquiry the investigation of the comparative selling prices of chains and independent dealers has recently been begun in an agricultural region. Des Moines, Iowa, has been selected as the center of the next study. The program for Des Moines also contemplates a study of the comparative prices of chain and independent stores in a number of smaller towns within the Des Moines wholesale area.

A preliminary survey of Des Moines was begun by a field force and this crew will divide the city into districts for pricing, make the necessary contacts with wholesalers and chain stores, ascertain the items handled by both chain and independent grocery, drug and tobacco retailers, prepare lists of items bought direct and through wholesalers and take the other necessary steps preparatory to the actual pricing work. As soon as this preliminary study has been completed the staff will be increased to the size necessary to carry on this work.

THE CANADIAN PHARMACEUTICAL ASSOCIATION.

The Canadian Pharmaceutical Association will meet in Nova Scotia this year, beginning August 2nd, at which time a tablet will be unveiled in memory of Louis Hebert, the pioneer apothecary of this continent. Trips will be made to the land of "Evangeline" and an interesting program is being provided. We are indebted to Secretary Dr. R. B. J. Stanbury for a photograph of the Sir William S. Glyn-Jones Memorial Tablet, recently unveiled in London.

PERSONAL AND NEWS ITEMS.



DR. WILLIAM H. WELCH.

In the *New York Times Magazine*, of April 6th, there is a picture of Dr. William H. Welch, drawn from life by S. J. Woolf. It is the picture of a man who matriculated in a medical school about sixty years ago. As teacher, his career began as instructor in Bellevue Medical College; since then his name has been foremost in the founding of Johns Hopkins

Medical School of which he is a former dean; he held the professorship of pathology, directorship of its School of Hygiene and Public Health and now is professor of the History of Medicine. He was brought into close relationship with Lister and Pasteur and studied under Koch. All of his outstanding work includes his services to Nation, state and city; he directed the thoughts of those with means to opportunities; served as president of the Maryland State Board of Health, on committees; interested himself in art and science, and thus might be told pages of his activities.

On April 8th, the 80th birthday of Dr. William H. Welch was celebrated; the President of the United States delivered the principal address which was broadcast and the world's men of science as well as Dr. Welch's friends and neighbors spoke of him and his activities. The central ceremonies took place in Memorial Continental Hall in Washington, and in the world's larger cities the life of Dr. Welch was the subject of addresses by medical men. He has an interest in everything that contributes to public health and welfare and it is literally true that millions have profited from his contributions; pharmacists honor him because of his vision, because of his service and accomplishments.

James C. Munch addressed the Baltimore Branch of the American Chemical Society at a meeting, held at the Johns Hopkins University, on "In Matters of Life and Death," He discussed poisons from various standpoints, including their detection by chemical and physiological means.

Heber W. Youngken gave an illustrated lecture, March 7th, at the Rhode Island College of Pharmacy on "The Drugs of the American Aborigines."

W. A. Puckner has been secretary of the Council on Pharmacy and Chemistry for twenty-five years, and celebrated the silver anniversary with that of the institution of the Council.

Dr. Frederick J. Cullen, medical officer in the U. S. Department of Agriculture, has been selected to head the drug control work of the department's food, drug and insecticide administration. This appointment fills the vacancy caused by the resignation of Dr. James J. Durrett to become state health officer of Alabama.

Dr. Jules Bebie, member of the A. PH. A., has retired from active duties as research director for the Monsanto Chemical Works, following a service of twenty-five years with the company. Dr. L. P. Kyrides has been appointed as his successor.

Dr. Thomas Parran, Jr., assistant surgeon general in the U. S. Public Health Service, has been appointed New York state commissioner of health.

Dr. Edward Kremers has been voted the Remington Honor Medal for 1930. It will be formally presented at the Baltimore meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION.

Clyde Eddy, pharmacist-explorer, member of the A. PH. A., was the guest of honor at the March 14th meeting of the National Geographic Society in Washington, D. C., and presented a lecture, "Down the Dangerous Colorado," to 4000 members of the Society gathered to hear him in the Washington Auditorium. His book "Down the World's Most Dangerous River," reviewed in the JOURNAL several months ago, is ranked as a classic among books on exploration.

The Committee on Pharmaceutical Economics, New York State Pharmaceutical Association, **Leon Monell,** Chairman, has issued a questionnaire, the purpose of which is to make a prescription survey and divisions of the drug store. The value of the work will be enhanced by the responses received. A report is to be made at the New York meeting and those who have not received the questionnaire can obtain copies from Professor Monell, Buffalo College of Pharmacy.

The drug trade is indebted to the Druggists' Research Bureau for its work, reported in its periodical bulletins. Its investigations have pointed out many faulty business methods and means for correcting them. Those who have studied the reports have profited by them. Recently bulletins 1–13 have been issued in bound volume; it is indexed and offers a convenient reference for the study of problems which confront the retailers in buying and selling. Bulletins may be obtained by addressing the Druggists' Research Bureau, 51 Maiden Lane, New York.

James F. Finneran, one of the best known pharmacists of the country, has joined the staff of McKesson & Robbins, Inc. He is a former president of the National Association of Retail Druggists and of the Massachusetts State Pharmaceutical Association. He has been a member of the AMERICAN PHARMACEUTICAL ASSOCIATION for many years and at the time was president of the New England Branch of the A. PH. A.

Frank E. Holliday, for many years an official of the National Wholesale Druggists' Association, was elected honorary member of the New York Drug and Chemical Club at its annual meeting.

Dr. Henry Leffmann, professor of chemistry in the Wagner Free Institute and in the Woman's Medical College of Pennsylvania, has been elected an honorary member of the Franklin Institute of the State of Pennsylvania.

Secretary E. F. Kelly attended a meeting of pharmacists in Buffalo, where the possibilities of a Western New York Branch of the A. PH. A. were discussed; steps looking forward to such an organization were taken. The meeting proved to be interesting and profitable.

R. L. Swain attended the meeting of the Boards and Colleges at Jacksonville, District No. 7, April 7th and 8th. He addressed the members on enforcement of laws relating to pharmacy and the possibilities of the Conference of Pharmaceutical Law Enforcement Officials.

Robert J. Ruth addressed the regional session of Maryland Pharmaceutical Association at Salisbury, April 14th. Dr. Edwin Bird, of Wilmington, editor of the *Delaware State Medical Journal* spoke on "The Pharmacist as an Outpost of Legislation." The meeting was attended by about 75 members and proved the value of regional state association sessions.

Dr. K. K. Chen spoke before the Northern Ohio Branch A. PH. A. on "Recent Studies of Ephedra and Ephedrine."

The *D. R. D. A. and M. S. P. A. Journal* stresses the importance of pharmacists taking a more active interest in State Association meetings.

The *Southeastern Drug Journal* is enthusiastic over the prospects of the State Association meeting in Georgia, to be held at Macon, April 23rd and 24th. Walter D. Jones, of Savannah, is the *President* of the Association and the *Journal* carries a picture of the *First Vice-President,* Thomas C. Marshall, of Atlanta, as frontispiece.

The April number devotes a number of columns to the meeting of the A. PH. A. in Baltimore.

The Badger Pharmacist, published by the Wisconsin Pharmaceutical Association, in the interest of its Jubilee meeting to be held in Madison, July 15th to 18th, contains interesting historical information. The April number gives an account of the Historical Drug Store installed as a unit in the Museum of the Wisconsin Historical Society, in 1913. It represents an early store building; its furnishings are representative of the period of about 1850, and have come from quite a number of Wisconsin drug stores. In front of the store is an iron hitching post—a colored boy clad in red trousers, supported by one suspender strap, and a blue decolleté shirt—which at one time did service in front of the drug store of Dunning & Sumner. The bottles, all other shelf ware, apparatus, etc., have historical interest, and the arrangement has a large part in telling the story of the early drug store and of pharmacy.

The New York State Pharmaceutical Association acting through its committee on Fair Trade, **Samuel S. Dworkin,** is making a study of the distribution of biologic products by others than retail pharmacists.

Secretary Walter D. Adams, after several years of search has succeeded in completing the records of presidents and secretaries of Texas Pharmaceutical Association. This work was extremely difficult because the proceedings had not always been printed by the Association, resulting in lack of uniformity in publication and distribution and preservation of copies.

Secretary Arthur G. Hulett will become a citizen of California by the end of this month. His removal means a loss to Arizona pharmacists, for he has been active in directing pharmaceutical affairs of the Association and Board of Pharmacy. He prompted the organization of the former and was secretary of the latter for about 26 years.

UNIVERSITY OF MARYLAND SCHOOL OF PHARMACY DEDICATION.

The new building recently erected by the state for the School of Pharmacy of the University of Maryland will be dedicated on Saturday afternoon, May 10th, and all who attend the meeting of the AMERICAN PHARMACEUTICAL ASSOCIATION are invited to be present at these exercises and thereafter inspect the building and its equipment and be guests at the banquet (following the afternoon ceremonies) given by the Alumni Association of the school, formerly the Maryland College of Pharmacy.

The dedication exercises will be held in Westminster Church, called the Church of the University. In the churchyard quite a number of persons known to fame are buried, among them Edgar Allan Poe.

NEW YORK DRUG AND CHEMICAL SECTION PLANS FOR LARGER ACTIVITIES.

At the meeting of the Drug and Chemical Section of the New York Board of Trade, on April 2nd, a motion was submitted to the Executive Committee which has as its purpose a larger field of activities. In submitting the resolution J. L. Hopkins emphasized that the Section was the representative of the combined drug, chemical and allied trades, and he proposed a change to the name "Drug Chemical and Allied Trades Association." He also proposed an increase in the membership and to have it open to those outside of New York City.

OBITUARY.

HERBERT C. EASTERDAY.

Herbert C. Easterday, member of the AMERICAN PHARMACEUTICAL ASSOCIATION, for many years a pharmacist of Washington, D. C., and a former president of the National College of Pharmacy, now a part of George Washington University, died at his home, 3214 Macomb Street, on March 11th. He was 67 years old. He was also a member and former treasurer of the District of Columbia Retail Druggists' Association and a director of the Washington Wholesale Druggists' Exchange.

The Maryland Pharmacist, in writing of the deceased, said:

"Few people are gifted with the elements of friendship and affection as was this man. To his friends he was all that a friend should be and more. He was gracious, considerate and true in his relationships; he was understanding and kindliness itself. His deep and loyal personality and his splendid character will long be remembered. His life was an inspiration not only to those who have come to the lengthening shadows of evening, but to those who stand at the gateway of accomplishment. The passing of Herbert C. Easterday leaves a void in the hearts of many who knew him as he really was."

Mr. Easterday is survived by his widow, Mrs. Lora Simpson Easterday, a sister and brother.

HARRY B. MASON.

Harry Beckwith Mason, long connected with Parke, Davis & Co., and for many years editor of the *Bulletin of Pharmacy*, died March 8th. He had been ill for a number of months.

Mr. Mason was born in North Granville, N. Y., and was a pharmacist in his early years. He was an alumnus of the Albany College of Pharmacy, and had received an honorary degree of "master in pharmacy" from the Philadelphia College of Pharmacy and Science in recognition of his pharmacal writings. In his connection with Parke, Davis & Co., he served successively as director of publications, director of promotion, secretary and member of the board of directors. He retired in January 1929, to devote himself to private interests.

Mr. Mason became a member of the AMERICAN PHARMACEUTICAL ASSOCIATION in 1896. Brief mention was made in the March JOURNAL, and a sketch appears in the January issue for 1929. He is survived by his widow, Luella Bonton Mason, and two daughters, Adelaide and Marjorie.

MARTIN H. SMITH.

Martin H. Smith, manufacturing chemist and president of the company bearing his name, died April 8th at Annapolis after a brief illness of pneumonia, aged 62 years. He was born in Annapolis and educated at St. John's College. On his graduation he came to New York City, where he established a retail drug business; in 1909 he branched out into the manufacture of proprietary specialties.

The deceased is survived by his wife, by two daughters, the Misses Dorothy and Muriel Smith, and by a sister, Mrs. Augusta Lloyd, of Annapolis. Mr. Smith was a member of the AMERICAN PHARMACEUTICAL ASSOCIATION.

Dr. Tokichiro Niwa, Professor Emeritus, Imperial University of Tokyo, and vice-president of the Japan Pharmacists Union, died at his home in Tokyo, March 12th, aged seventy-five years. He was a member of the Japanese Pharmacopœial Commission and Councilor of the Tokyo Health Department.

Professor Niwa graduated in pharmacy at the University of Tokyo and after studies in pharmacy at European universities he returned to his *Alma Mater* as a member of the faculty.

SOCIETIES AND COLLEGES.

SEVENTY-EIGHTH ANNUAL MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, EMERSON HOTEL, BALTIMORE, MD., MAY 5TH TO 10TH.

The Entertainment Program occupies every free moment of the week of May 5th; that for the ladies will include sight-seeing, card parties, trip to historic Annapolis, many additional features, and also the entertainments provided for the members. In outline the program will be found on pages 298–299 of the March JOURNAL; the complete program will be supplied later. A further reference will follow at end of the program.

Part of the Section programs will follow in these columns.

Excellent auto service will be provided at $4.00 from May 3rd to 12th, or day service at 75¢ per day. Write to the Local Secretary, inquire at Information Desk or write "Downtown Garage," 208 Water St., Baltimore.

Speakers of prominence will add to the interest of the meeting and you profit by hearing the addresses. Governor Ritchie, of Maryland, will be in attendance.

Railroad Rates.—See your Railroad Agent early, read also the information on page 215 of the March JOURNAL.

Hotel Rates will be found in the same issue on page 312, also in the advertising section of this number.

The Research Conference will be held on Monday, May 12th, at the New Willard, Washington, D. C.

The Plant Science Seminar will be held in Washington, during week of May 12th.—Write Dr. C. C. Plitt, Lombard and Green Sts., Baltimore, Md.

The Symposium Genus Mentha will be held in Baltimore, during the week of May 5th, write Prof. F. J. Bacon, 2045 Adelbert Road, Cleveland, Ohio.

The Conference of Pharmaceutical Secretaries and the **Conference of Pharmaceutical Law Enforcement Officials,** will be held during the week of May 5th—see program of the March JOURNAL.

For hours of the **General Sessions,** of the **House of Delegates,** of the **American Association of Colleges of Pharmacy,** of the **National Association of Boards of Pharmacy**—see program in March JOURNAL, pages 298–299; also in these columns.

Programs of all Sections are subject to rearrangement in the Official Program.

THE SECTIONS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

SCIENTIFIC SECTION.

Officers: *Chairman,* H. A. Langenhan; *First Vice-Chairman,* E. E. Swanson; *Second Vice-Chairman,* W. J. Husa; *Secretary,* L. W. Rowe; *Delegate to the House of Delegates,* James C. Munch.

Sessions: Wednesday, May 7th, 2:00 P.M. Joint Session with Section on Practical Pharmacy and Dispensing, Thursday, May 8th, 8:00 P.M. Second Session, Friday, May 9th, 2:00 P.M.

WEDNESDAY, MAY 7TH, 2:00 P.M.—*First Session.*

1. Chairman's Address.
2. Secretary's Report.
3. General Business (Committee Reports, etc.).

PAPERS.

4. *Pharmaceutical Chemistry.*

"Physics in Pharmacy, Part III, on Unusual Drops and Bubbles," John Uri Lloyd, Wolfgang Ostwald and Walter Haller.

"Arsenic Determination in Bismuth and Barium Salts," L. W. Green and R. E. Schoetzow.

"Laboratory Notes on Alcohol Determinations," R. E. Schoetzow.

"Reaction of Bismuth Magma N. F. V," K. W. Smith and R. E. Schoetzow.

"A Study of the Darkening of Cod Liver Oil in the Presence of Iron," A. E. Briod and W. G. Christiansen.

"Vapor Pressure of Dichlor Ethyl Ether," B. L. Meredith and W. G. Christiansen.

"Use of Barium Oxide for the Dehydration of Alcohol," B. L. Meredith and W. G. Christiansen.

"Corrosion of Metals by Iodine," B. L. Meredith and W. G. Christiansen.

"The Preparation of a a'Diamino Pyridine," E. C. Billheimer and W. G. Christiansen.

"A Study of Cocoanut Oil Soap and Soaps of Its Various Fatty Acids," Wm. A. Lott and W. G. Christiansen.

"A Study of Ethanolamine Soaps," Wm. A. Lott and W. G. Christiansen.

"The Preparation of Propadiene Free of

Toxic Impurities," Wm. A. Lott and W. G. Christiansen.

"A Comparison of the p_H of Neoarsphenamine and Sulpharsphenamine in Relation to Differences in Their Structure," A. E. Jurist and W. G. Christiansen.

"Studies on Alkali Bismuth Tartrates from the Chemical and Biological Standpoint," A. E. Jurist and W. G. Christiansen.

"The Preparation of 2-Carbamids-4-Hydroxy-Phenylarsonic Acid," W. G. Christiansen and A. E. Jurist.

"The Deportment of Camphor, Monobromated in Reference to Compressed Medicinal Tablets," George E. Ewe.

"The Market Quality of Pharmaceutical Raw Materials," George E. Ewe.

Comments Pertinent to the Coming Revisions of the U. S. P. and N. F., George E. Ewe.

"The Phytochemical Study of Hydrastis," H. A. Langenhan and Ewin Gillis.

"Further Studies on the Salvarsans and Related Compounds," C. N. Myers.

"The Analysis of Ethylene Diamine Theophyllin," Phillip W. Schmitt.

"Examination of the Fatty Oil of Fehinacea," S. H. Culter and Edward Kremers.

"Emulsions," C. O. Lee and Edward Kremers.

"The Interaction between Thymoquinone and Potassium Sulphite," W. W. F. Enz and Edward Kremers.

5. *Pharmacognosy and Botany.*

"Plant Breeding Experiments with the Genus Aconitum," Wm. J. Bonisteel.

"The Inorganic Constituents of the Acid-Soluble Portion of the Ash of Official and Non-Official Vegetable Drugs," E. L. Newcomb and E. B. Fischer.

"The Chemical and Biological Assays of Oleum Chenopodii," William F. Reindollar and James C. Munch.

"A Statistical Study of Pharmacopœial Constants of Oleum Chenopodii," James C. Munch and William F. Reindollar.

"Oils from the Leaves of Washington Conifers," Arnold J. Lehman and E. V. Lynn.

"The Leaf Oil of Pinus Monticola," Arnold J. Lehman and E. V. Lynn.

"The Leaf Oil of Juniperus Scopulorum," Arnold J. Lehman and E. V. Lynn.

"The Leaf Oil of Tsuga Heterophylla," Arnold J. Lehman and E. V. Lynn.

"The Leaf Oil of Picea Sitchensis," Arnold J. Lehman and E. V. Lynn.

"Further Studies on Viburnum," Heber W. Youngken, James C. Munch and Florin J. Amrhein.

Joint Session Scientific Section and Section on Practical Pharmacy and Dispensing.

THURSDAY, MAY 8TH, 8:00 P.M.

6. Report on the U. S. Pharmacopœia, E. Fullerton Cook.

7. Report on the National Formulary, E. N. Gathercoal.

8. Report of Committee on Ebert Prize, G. L. Jenkins.

9. Report on Pharmaceutical Recipe Book, J. Leon Lascoff.

10. Report of Committee on Ebert Prize, Glenn, L. Jenkins.

11. Report of Committee on Chairman's Address.

FRIDAY, MAY 9TH, 2:00 P.M.—*Second Session.*

12. *Pharmacology and Bio-Assays.*

"The Important Factors of Digitalis Standardization with a New Method of Assay," William Nyiri and Louis Du Bois.

"Purification of Dynamite and Saponification Grade Glycerin," A. E. Briod and W. G. Christiansen.

"Comparative Pharmacology of Iodine and Mercurochrome," David I. Macht.

"Pharmacological Comparison of Twenty-Three Isomeric Octyl Alcohols," David I. Macht and Miss Harriet P. Leach.

"U. S. P. Biological Assay of Cod Liver Oil, Present and Future," John F. Anderson.

"Certain Aspects of Carbohydrate Metabolism," John C. Krantz, Jr.

"A Study of the Action of Phenylpropanolamine upon the Blood Sugar of Rabbits," John C. Krantz, Jr., and Walter H. Hartung.

"Bio-Assay of Capsicums and Chillies. II. The Pungency of Oleoresins Prepared with Various Solvents," James C. Munch.

"The Application of Statistical Methods to Pharmaceutical Research. I. Measures of Accuracy," James C. Munch.

"The Application of Statistical Methods to Pharmaceutical Research. II. Correlation Coefficients," James C. Munch.

"The Pharmacology and Pharmacognosy of the Cactacae. I. The Action of Certain Species upon the Heart," James C. Munch and H. H. Crosbie.

"The Pharmacology and Pharmacognosy of the Cactacae. II. The Action of Certain

Species upon the Central Nervous System," James C. Munch and H. H. Crosbie.

"The Quality of Tincture of Aconite," H. B. Haag and L. W. Hawkins.

"Studies on the Toxicity, Absorption and Elimination of Nupercain," W. R. Bond and N. Bloom.

"The Relaxant Action of Benzyl Derivatives," Lewis C. Britt and E. V. Lynn.

"Comparative Assays of Cannabis and Jamaica Dogwood upon Dogs and Rabbits," James C. Munch.

"Alopecia among Animals Resulting from Thallium Poisoning," F. E. Garlough and Justus C. Ward.

"Colorimetric Method for Assay of Ergot," M. J. Smith.

"The Physiological Potency of Commercial Ergot Preparations," Wm. T. McClosky, M. R. Thompson and N. G. Barbella.

13. *Pharmaceutical Chemistry.*

"A Potentiometric Assay of Cinchona Bark," John C. Krantz, Jr.

"The Estimation of Poisons in the Presence of Preservatives," L. W. Rising and E. V. Lynn.

"The Reinsch Test as a Quantitative Method for Mercury," W. D. Strother and L. W. Rising.

"The Hydrolysis of Arsenous Iodide," William J. Husa.

"The Stabilization of Solution of Arsenous and Mercuric Iodide, U. S. P. X," William J. Husa and W. W. F. Enz.

"The Effect of Stabilizers in Lard in Relation to Its Use in Ointment of Potassium Iodide, N. F. V," William J. Husa.

"A Physico-Chemical Method of Measuring the Activity of Pepsin. Part I. A Preliminary Study," E. R. Theis.

"The Conversion of Quinine and Other Cinchona Alkaloids into Their Toxines and the Question as to the Toxicity of Quinine," Henry C. Biddle.

"A Physico-Chemical Method of Measuring the Activity of Pepsin. Part I. A Preliminary Study," E. R. Theis.

"The Variability of Pharmaceutical Preparations. Preliminary Report," H. B. Haag and L. E. Jarrett.

"Chemical Study of Senecio Aureus," Edgar A. Kelly and E. V. Lynn.

"A Progress Report on the Estimation of Ethyl Nitrite in Copaiba Mixture, N. F.," W. G. Crockett, W. M. Frayser and G. V. Thompson.

"The Citric Acid Assay of Solution of Magnesium Citrate," H. V. Arny and Hugo H. Schaefer.

"The Constitution of Cantharidin," Francis D. Dodge.

"The Effect of Heat upon Acacia," L. F. Gabel.

"Rape Oil as an Olive Oil Adulterant," Reginald C. Miller and C. W. Ballard.

"Further Studies upon the Masking of the Apparent Bitterness of Strychnine," Justus C. Ward and James C. Munch.

Reports, etc., follow, will be added in official program.

SECTION ON EDUCATION AND LEGISLATION.

Officers: *Chairman*, Glenn L. Jenkins; *Vice-Chairman*, B. V. Christensen; *Secretary*, Rudolph H. Raabe; *Delegate to the House of Delegates*, W. F. Rudd, F. Poe.

Sessions: Wednesday, May 7th, 2:00 P.M., Thursday May 8th, 8:00 P.M.

(Additional papers will appear in the official program.)

1. *Chairman's Address*, Glenn L. Jenkins.
2. *Secretary's Report*, Rudolph H. Raabe.
3. *Papers.*

"Trend of Legislation as Indicated by the Courts," R. L. Swain.

"Visualizing Materia Medica," C. J. Zufall.

"An Educational Study of Student Nurses in Pharmacy," Lula E. Kennedy, J. Cary Taylor and John C. Krantz, Jr.

Title to Be Announced, A. L. I. Winne.

"Limited Content of Present Pharmaceutical Curricula," Wortley F. Rudd.

"The Junior College in Relation to Pharmaceutical Education," Frederick J. Wulling.

"U. S. P. and N. F. Preparations Fit for Beverage Purposes," W. Bruce Philip.

(Order of reports and a number of additional papers will appear in official program.)

SECTION ON PRACTICAL PHARMACY AND DISPENSING.

(Pharmacopœias, Formularies and Standards.)

Officers: *Chairman*, H. C. Newton; *Vice-Chairman*, Charles V. Netz; *Secretary*, E. O. Leonard, Pocatello, Idaho; *Delegate to the House of Delegates*, John C. Krantz, Jr.

Sessions: Thursday, May 8th, 9:00 A.M.; Thursday May 8th, Joint Session with Scientific Section. Second Session, Friday, May 9th, 2:00 P.M.

(The papers for this Section will be arranged in the official program.)

1. *Chairman's Address*, H. C. Newton.
2. *Secretary's Report*, E. O. Leonard.
3. *Papers.*

"The Acidity of Aromatic Elixir," John C. Krantz and Jelleff Carr.

"Results of U. S. P. Study," Dr. E. Fullerton Cook.

"What Is the Pharmacist's Professional Service Worth?" Robert J. Ruth.

Title to Be Announced, Marvin J. Andrews.

Title to Be Announced, F. W. Nitardy.

"Borax and Cold Cream," Wilbur L. Scoville.

Title to Be Announced, William F. Reindollar.

"Prescription Business in Buffalo," Leon Monell.

"Drug Dispensing in a Large Hospital," R. S. Fuqua.

"An Improved Method for the Manufacture of Fluidextract of Squill, U. S. P.," M. H. Tagg, S. F. Firebaugh and James C. Munch.

Title to Be Announced, A. C. Taylor.

Other titles to be added.

For program of the Joint Session with the Scientific Section, see Scientific Section.

Order of reports and a number of additional papers will appear in official program.

Section on Commercial Interests.

Officers: *Chairman*, Denny Brann; *Vice-Chairman*, Jos. G. Noh; *Secretary*, Rowland Jones; *Delegate to the House of Delegates*, R. B. Rothrock.

Sessions: Wednesday, May 7th, 2:00 P.M. Thursday, May 8th, 8:00 P.M.

The Order of Business and Papers will be arranged in Official Program.

1. *Chairman's Address*, Denny Brann.
2. *Report of Secretary*, Rowland Jones.
3. *Appointment of Committees.*
4. *Papers.*

"The Importance of Net Profit," by C. Leonard O'Connell.

"Shall We Make or Buy Our Pharmaceuticals?" by Charles J. Clayton.

"How a State Secretary Can Best Serve," by Walter D. Adams.

"Your Guest—the Drug Store Customer," by W. Bruce Philip.

"The Druggist—Well, What about Him?" by Robert J. Ruth.

"Profit, Total Sales and Rent," by J. A. W. Luck.

"What Should a Prescription Man Expect from a Professional Service Man?" by Charles E. McCormick.

"Does the Present Form of the Pharmacopœia Interest the Practicing Physician?" by Ambrose Hunsberger.

"The Pleasures and Satisfactions of Ethical Pharmacy," by Thomas Roach.

"Build Your State Associations on County and Congressional Units," by Bernard M. Keene.

"We Do Not Substitute—or Do We?" by Leonard A. Seltzer.

"New Cloth on an Old Garment, or New Light on an Old Subject," by Leonard A. Seltzer.

"Seven Ways to Meet Competition," by Clyde L. Eddy.

"The New York State Questionnaire," by Leon Monell.

Other numbers will be added and the usual business transacted at the close of the Second Session.

Section on Historical Pharmacy.

Officers: *Chairman*, George D. Beal; *Secretary*, J. T. Lloyd; *Delegate to House of Delegates*, Lyman F. Kebler; *Historian*, E. G. Eberle.

Sessions: Wednesday, May 7th, 2:00 P.M. Thursday, May 8th, 9:00 A.M.

1. *Chairman's Address*, George D. Beal.
2. *Secretary's Report*, J. T. Lloyd.
3. *Historian's Report*, E. G. Eberle.
4. *Papers.*

"O. Henry and Pharmacy," by Charles H. and Millicent R. LaWall.

"Ex-Presidents of A. PH. A. from Baltimore," by David M. R. Culbreth.

"The Search for the Active Principles in the Narcotic Solanums," by F. B. Kilmer.

"Note on an Ancient Poisonous Plant of Asia Minor," by L. E. Warren.

"Alexander Nicolaus Scherer," by Edward Kremers.

"Benedict Arnold—Pharmaceutical Preparations and Samples Sold by Him," by R. D. Bienfang.

"Karl Wilhelm Scheele, the Apothecary Scientist of 18th Century, Sweden," by Lieut. Commander Louis H. Roddis.

"Notes on the Deceased Chairmen of the Revision Committee of the U. S. Pharmaco-

pœia," by Arno Viehoever, Charles H. LaWall, Virgil Coblentz and Ivor Griffith.

"History of the U. S. Dispensatory," by H. C. Wood, Jr.

"History of the National Formulary," by W. L. Scoville.

"History of the Recipe Book," by J. Leon Lascoff.

"History of Pharmacy Week," by Robert J. Ruth.

"U. S. National Museum Pharmaceutical Collection," illustrated, by Charles Whitebread.

"Claudius Galen," by Louis Wait Rising.

"History of Hamamelis Virginica," by John Uri Lloyd.

"The Pioneer Pharmacist, William S. Merrell," by Charles G. Merrell.

"An Historical Sketch of the North Carolina Pharmaceutical Association."

The order of papers and business will be scheduled in the Official Program.

PLANT SCIENCE SEMINAR.

Meetings of the Plant Science Seminar will be held in Washington after the conclusion of the U. S. P. Convention.

Officers: *Chairman*, Charles C. Plitt; *Secretary*, O. P. M. Canis.

SYMPOSIUM ON THE GENUS MENTHA.

F. J. BACON, *Chairman*.

The fourth Symposium on the Genus Mentha will be held in Baltimore during the week of May 5th. The time of meeting will be announced at the Convention.

NATIONAL CONFERENCE ON PHARMACEUTICAL RESEARCH.

The ninth annual meeting of the National Conference on Pharmaceutical Research will be held in Washington, D. C., Monday, May 12th. Program will be printed in Official Association Program.

Officers: *Chairman*, E. N. Gathercoal; *Vice-Chairman*, E. Fullerton Cook; *Secretary*, John C. Krantz, Jr.; *Treasurer*, Philip I. Heuisler; *Members of Executive Committee:* H. V. Arny, L. E. Warren, L. L. Walton.

CONFERENCE OF PHARMACEUTICAL ASSOCIATION SECRETARIES.

EMERSON HOTEL.

Sessions: Thursday, May 8th, 9:00 A.M. Friday, May 9th, 2:00 P.M. Order of Business and Papers in Official Program.

Officers: *President*, W. Bruce Philip; *First Vice-President*, J. G. Beard; *Second Vice-President*, Walter D. Adams; *Secretary-Treasurer*, Charles J. Clayton; *Executive Committee: Chairman*, P. J. Garvin, W. B. Day, A. C. Taylor, J. L. Hayman.

Order of Business and Papers will be printed in Official Program.

CONFERENCE OF PHARMACEUTICAL LAW ENFORCEMENT OFFICIALS.

EMERSON HOTEL.

Sessions: Thursday, May 8th, 9:00 A.M. Friday, May 9th, 2:00 P.M.

Officers: *Chairman*, R. L. Swain; *Secretary*, M. N. Ford.

Order of Business and Papers will be printed in Official Program.

NATIONAL ASSOCIATION OF BOARDS OF PHARMACY.

The twenty-seventh Annual Meeting of the National Association of Boards of Pharmacy will be held in Hotel Emerson, Baltimore, May 5th and 6th.

Officers: *President*, John A. J. Funk, Galveston, Ind.; *Secretary*, H. C. Christensen, Chicago.

For Tentative Program see Department of National Association of Boards of Pharmacy in this issue of the JOURNAL.

The Program will be included in Official Program.

AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY.

The Thirty-First Annual Meeting of the American Association of Colleges of Pharmacy will be held in Hotel Emerson May 5th and 6th. Program follows:

MONDAY, MAY 5TH.

8:30 A.M. MEETING OF EXECUTIVE COMMITTEE.

9:30 A.M. MEETING OF TEACHERS' CONFERENCES.

Chemistry Conference, George L. Webster, *Chairman*.

Pharmacy Conference, A. O. Mickelsen, *Chairman*.

Materia Medica Conference, H. W. Youngken, *Chairman*.

Pharmaceutical Economics, C. H. Stocking, *Chairman*.

CONFERENCE OF TEACHERS OF PHARMACY.

Officers: A. O. Mickelsen, *Chairman;* Charles J. Fuhrman, *Secretary.*

1. Pharmacy Laboratory Work to Be Given in the Freshman Year, R. W. Clark and A. H. Uhl.
2. How and When to Introduce Prescription Compounding, Gustav Bachman.
3. Teaching Metrology in the Laboratory, R. T. Lakey.
4. A Method for Teaching Incompatibilities in Prescriptions, William J. Husa.
5. Should Chemical Reactions Be Stressed in Teaching Pharmacy? Samuel Shkolnik.

CONFERENCE OF TEACHERS OF MATERIA MEDICA.

Officers: H. W. Youngken, *Chairman;* A. R. Bliss, Jr., *Secretary.*

1. The Teaching of Public Health, Taliaferro Clark. *Discussion:* R. C. Williams, A. R. Bliss, Jr., and H. C. Wood, Jr.
2. The Teaching of Botany, C. C. Plitt. *Discussion:* H. W. Youngken, F. J. Bacon, and O. P. M. Canis.
3. The Teaching of Pharmacognosy, F. J. Bacon. *Discussion:* E. N. Gathercoal, B. V. Christensen.

Other Conference programs will be printed in Official Program.

MONDAY, MAY 5TH, 2:00 P.M.

First Session of Association.

1. Roll Call.
   Memorial to Professor Wagener.
   Appointment of Resolutions Committee.
2. President's Address, J. G. Beard.
3. Report of Secretary-Treasurer, Zada M. Cooper.
4. Report of Executive Committee, C. B. Jordan.
5. Appointment of Nominating Committee.
6. Remarks on "The Four-Year Course," J. W. Sturmer.
7. Paper, "Teaching of Pharmaceutical Jurisprudence," William J. Husa.
8. Paper, "College Orientation Period," A. Ziefle.
9. Report of Committee on Higher Educational Standards, C. A. Dye.
10. Report of Committee on Activities of Students and Alumni, C. L. O'Connell.

MONDAY, MAY 5TH, 6:00 P.M.

Annual Dinner.
Address to Be Announced.

MONDAY, MAY 5TH, 8:00 P.M.

Second Session of Association.

11. Report of Committee on Curriculum and Teaching Methods, T. R. Leigh, *Chairman;* H. C. Biddle, E. H. Kraus, J. A. Koch, R. A. Lyman.
12. Meeting of Executive Committee following this session.

JOINT SESSION OF THE NATIONAL ASSOCIATION OF BOARDS OF PHARMACY AND THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY.

TUESDAY, MAY 6TH, 9:00 A.M.

Report of the Fairchild Scholarship Committee, E. G. Eberle.

Discussion: "Status of Pharmacists Who Leave the U. S. Navy."

Report of Committee on Study of Pharmacy.

TUESDAY, MAY 6TH, 2:00 P.M.

Third Session of Association.

13. Report of Committee on Investigation of Pharmacy Schools by Carnegie Foundation, E. V. Howell, *Chairman.*
14. Report of Syllabus Committee, J. G. Beard.
15. Report of Special Committees:
    (*a*) To Coöperate in an Advisory Capacity in the Revision of the Syllabus, J. A. Koch, *Chairman.*
    (*b*) Student Branches of the AMERICAN PHARMACEUTICAL ASSOCIATION, B. V. Christensen, *Chairman.*
    (*c*) On Establishment of a Pharmaceutical Corps in U. S. Army, A. R. Bliss, Jr., *Chairman.*
    (*d*) On Relation of Boards and Colleges, Edward Spease, *Chairman.*
    (*e*) On the Study of Pharmacy (Given at Joint Session).
16. Reports of Special Appointees:
    (*a*) Drug Trade Bureau of Public Information, E. F. Cook.
    (*b*) Reporter on Biological Abstracts, H. W. Youngken.
    (*c*) To National Conference on Pharmaceutical Research, H. E. Langenhan.
    (*d*) Druggist Research Bureau, P. C. Olsen.
    (*e*) National Drug Trade Conference, A. G. DuMez.
    (*f*) House of Delegates of the A. PH. A., C. B. Jordan.

(*g*) Committee on Simplified Practice, L. F. Bradley.
(*h*) National Association of Retail Druggists, F. J. Wulling.
(*i*) American Council on Education, C. H. LaWall.
(*j*) Reclassification of Pharmacists in the Field Service of the Federal Government, A. G. DuMez.
(*k*) Congress on Medical Education, W. B. Day.
(*l*) Reorganization of the Medical Personnel of the War Veterans Bureau, A. G. DuMez.

17. Unfinished Business.
18. Miscellaneous Business.
19. Election of Officers.
20. New Business.
21. Executive Session.

ENTERTAINMENT PROGRAM OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The following is a partial program of the entertainments during the meeting in Baltimore.

For the Ladies: *Monday*, Informal Tea, Dance. *Tuesday*, Card Party, Banquet and Dance. *Wednesday*, Historical Sight-Seeing Trip, Theatre Party. *Thursday*, Auto Ride—Loch Raven and Green Spring Valley, Tea (Mrs. H. A. B. Dunning) Baltimore Country Club, Musical and Dance. *Friday*, All-day trip to Historic Annapolis, Luncheon, Drill at Naval Academy. *Saturday*, On Water around Baltimore Harbor, Fort McHenry, Air Ports, Fort Carroll, Luncheon.

For the Members: Visits to Industrial Plants of Baltimore, under direction Baltimore Association of Commerce. *Monday*, Informal Dance. *Tuesday*, Banquet and Dance. *Thursday*, Dance. *Saturday*, Trip, as for Ladies.

AT WASHINGTON.

The Smithsonian Institution invites members to visit the Pharmaceutical Exhibit. Chairman E. Fullerton Cook will arrange an exhibit relating to U. S. P. preparations and also of photographs of former members of Revision Committees and historical records at the new Willard Hotel.

A Color Exhibit will be shown in connection with the U. S. Pharmacopœial Convention. It will interest the members to know that 267 color names are used about 2400 times in U. S. P. X. The exhibit will give an historical account, and methods of analyzing and naming colors. The Exhibit is sponsored by the following committee:

H. V. Arny, Professor of Pharmaceutical Chemistry, Columbia University; George D. Beal, Assistant Director, Mellon Institute; Knight Dunlop, Professor of Psychology, John Hopkins University; Bess Eleanor Foster, Art Director, Minneapolis Public Schools; E. N. Gathercoal, Professor of Pharmacognosy, University of Illinois; M. Luckiesh, Director of Research, National Lamp Works of General Electric Company; A. E. O. Munsell, Color Consultant, Baltimore; M. Rea Paul, Research Laboratories, National Lead Company; Margaret Hayden Rorke, Secretary and General Manager, Textile Color Card Association; F. F. Rupert, Fellow, Mellon Institute; Walter M. Scott, Chemist, Munsell Color Company, Baltimore.

THE A. PH. A. HEADQUARTERS SITE.

Everyone will want to visit the site of the American Institute of Pharmacy. The completion of this building and its equipment constitutes the greatest forward step for American pharmacy. The location is ideal.

THE PROGRAMS OF THE A. PH. A. MEETINGS.

It has been found impossible to print the complete programs of all sessions, and some of them are subject to change. Additions and corrections will be made in the Official Program now being arranged. Titles, abstracts, reports, etc., should be mailed at once to the JOURNAL A. PH. A., 10 West Chase St., Baltimore, Md.

REPORTS OF BRANCHES, AMERICAN PHARMACEUTICAL ASSOCIATION, RECEIVED TOO LATE FOR INCLUSION IN THIS ISSUE OF THE JOURNAL.

The reports of Northern Ohio Branch and of the Philadelphia Branch, A. PH. A. were received too late for inclusion in this issue of the JOURNAL and will be printed in May number. Mention is made so that these branches may receive due credit.

C. Leonard O'Connell reports that a meeting of the Pittsburgh Branch, A. PH. A. and the Pittsburgh College of Pharmacy, Student Branch will hold a meeting at the Pittsburgh College of Pharmacy, May 1st. Original essays prepared by students will be presented.

THE EIGHTH GENERAL MEETING OF THE INTERNATIONAL PHARMACEUTICAL FEDERATION (FEDERATION INTERNATIONALE PHARMACEUTIQUE), AT STOCKHOLM, JULY 16–19, 1930.

PROGRAM.

WEDNESDAY, JULY 16TH.

11:00 A.M.—Council Meeting at the House of The Society of Apothecaries, 26, Vallingatan (Council Room). Agenda:

4:00 P.M.—Visit to Skansen: "Ovre Solliden" (Rendezvous at 4:00 P.M.). For all those attending the meeting and their families. (Membership Card No. 1.)

THURSDAY, JULY 17TH.

10:00 A.M.—General Meeting of all members of the Federation at 26, Vallingatan (Library Room). Professional questions: Agenda. . .

12:00 M.—Reception and Lunch by the City of Stockholm, to which all members and their ladies are invited. (Membership Card No. 2.)

4:00 P.M.—General Meeting. Continuation of the agenda.

8:00 P.M.—Dinner at the main restaurant of the Stockholm Exhibition. Members and their ladies will be the guests of the Society of Apothecaries, the Apothecaries' Association of Sweden and the Pharmaceutical Association of Sweden. (Membership Card No. 10.)

FRIDAY, JULY 18TH.

10:00 A.M.—General Meeting at 26, Vallingatan (Library Room). Scientific questions: Agenda 1:00 to 3:00 P.M. Interval for lunch.

3:00 P.M.—General Meeting: Continuation of the agenda.

7:00 P.M.—Official banquet at Hasselbacken, at which all foreign members and their ladies will be the guests of the Society of Apothecaries, the Apothecaries' Association of Sweden and the Pharmaceutical Association of Sweden. (Membership Card No. 11.) Evening dress.

SATURDAY, JULY 19TH.

12:00 M.—Trip through the archipelago of Stockholm on a steamer leaving "Skeppsbron Quay" (close to the statue of Gustavus III), at 12:00 M. The foreign members and the ladies will be the guests of the local Stockholm branches of the Apothecaries' Association of Sweden and the Pharmaceutical Association of Sweden at Lunch at Saltsjöbaden, 2:00 P.M. (Membership Card No. 12.)

Information for Members of the Meeting.—On each day of the meeting, visitors will be received between 10:00 A.M. and 1:00 P.M. at the Apothecaries' Control Laboratory, the Royal Pharmaceutical Institute and the State Pharmaceutical Laboratory.

Addresses.—The Apothecaries' Control Laboratory: "St. Erik" Pharmacy, 57, Flemingatan (Tramlines 2 and 11). The Royal Pharmaceutical Institute: 49, Kungstensgatan. The State Pharmaceutical Laboratory: 2, Vallingatan.

Visits to Pharmacies.—Members of the meeting who wish to visit some of the pharmacies in Stockholm, should list their names at the Congress Bureau, 26, Vallingatan, where arrangements will be made for the visits.

Associated Members are entitled to take part in the general meeting and discussions.

Dress.—Optional at all the official receptions, etc., with the exception of the Banquet on Friday, when evening dress is desirable.

The program for the Ladies is not yet quite ready, but the Committee hopes to arrange a varied and attractive one.

We are indebted for the program to our honorary member, Knut Sjöberg, one of Stockholm's foremost pharmacists, a member of the Federation.

AMERICAN CHEMICAL SOCIETY.

The American Chemical Society held its seventy-ninth meeting in Atlanta, April 7th–11th. A Symposium on Analytical Chemistry was held under the Division of Inorganic Chemistry, H. H. Willard, *Chairman*. Among the addresses and papers were the following:

"Modern Trends in Analytical Chemistry," H. H. Willard; "X-Ray and Analytical Chemical Research," George L. Clark; "Microscopic Methods in Analytical Chemistry," Clyde W. Mason; "Modern Theories of Solution," Victor K. LaMer; "Colloidal Behavior in Analytical Chemistry," Harry B. Weiser.

AMERICAN DRUG MANUFACTURERS ASSOCIATION.

The American Drug Manufacturers Association will hold its annual meeting in the Carolina Hotel, Pinehurst, N. Car., April

22nd–26th. A very interesting program has been arranged for the meeting. S. Barksdale Penick is president of the Association, and Carson P. Frailey the secretary. The Section Chairmen are: *Scientific*, Paul S. Pittenger; *Biological*, S. D. Beard; *Pharmaceutical*, Thurston Merrell; *Crude Drug*, F. A. Cornelius; *Medicinal Chemical*, George W. Merck.

An elaborate series of entertainment features have been planned for the convention.

LEGAL AND LEGISLATIVE.

THE PARKER BILL HAS BECOME LAW.

As stated in an editorial of this issue the passage of the Parker Bill means that Government public health activities will be of greater service; also, it is a step in progress of national legislation wherein pharmacists have been given recognition. The Bill is printed on pages 202–204 of the February JOURNAL; a few amendments were made but these have no bearing on pharmacy.

The AMERICAN PHARMACEUTICAL ASSOCIATION and other organizations of the drug industries have actively coöperated with the author, the Congressional Committee and the Public Health Service in the promotion of this important measure. This Bill in its general scope and purpose is the same as that of the 70th Congress, which was passed by both Houses of Congress, but vetoed by President Coolidge, for reasons that have been corrected in this law.

At that time, the AMERICAN PHARMACEUTICAL ASSOCIATION endeavored to have the designation "including pharmacists engaged on comparable duties" changed, so that it would agree with those of others recognized in the Bill. In the measure, as passed, and signed by President Hoover, provision is made, as will be noted by reading the enactment, for pharmacist officers of the Service on the same basis as to appointment, pay, promotion, disability privileges, etc., as for medical officers.

This is the first time in a number of years, that pharmacists have had recognition in national legislation and it is particularly pleasing that there are no inequalities; pharmacists are encouraged thereby that other pending bills will be successfully carried forward.

SALES OF MEDICINE IN LOUISIANA.

Article 442 of the Sanitary Code of Louisiana reads: "Sales of Medicines by Itinerant Vendors Prohibited. (*a*) No drug, drug preparation, instrument, device, apparatus or article designed or intended for the relief or cure of any ailment or disease shall be sold or offered for sale by any itinerant vendor.

"(*b*) No official shall issue a permit or license authorizing the sale of preparations by an itinerant vendor."

That this statute is constitutional seems plain from a decision of the Supreme Court in 1914, sustaining a provision in the Louisiana laws of 1894 forbidding sales by itinerant vendors "of any drug, nostrum, ointment or application of any kind, intended for the treatment of disease or injury," although allowing sales by "all persons except itinerant vendors" of such articles "intended for the cure of diseases."—Clinton Robb Esq.—United Medicine Manufacturers of America.

PORTER BILL—H. R. 11,143.

Creation of a bureau of narcotics in the Treasury Department, to be headed by a commissioner of narcotics, is provided for in the Porter Bill (H. R. 11,143) passed by the House, April 7th.

The Bill was called up by the chairman of the Committee on Ways and Means, Representative Hawley of Salem, Oregon, who reported it to the House for that Committee. It was sponsored by Representative Porter, of Pittsburgh, Pa. The Bill now goes to the Senate.

A summary of the provisions of the Bill follow:

Section 1 creates a new bureau in the Treasury Department to be known as the Bureau of Narcotics and the office of Commissioner of Narcotics. The commissioner will be appointed by the President, by and with the advice and consent of the Senate, and will receive a salary of $9000 per annum. The commissioner is required to make an annual report to Congress.

Section 2 authorizes the Secretary of the Treasury to appoint one deputy commissioner without regard to the civil service laws and, under the civil service laws, such officers and employees as are necessary to perform the

duties vested in the Bureau. The salaries of the deputy commissioner and of all officers and employees shall be fixed in accordance with the Classification Act of 1923. The number of officers and employees appointed, of course, will be limited by the appropriations made available by Congress. In case of the absence or disability of the Commissioner of Narcotics or if there is a vacancy in the office of commissioner, the deputy commissioner shall act as commissioner. In the case of the absence or disability of the commissioner and deputy commissioner, or if there is a vacancy in the offices of commissioner and deputy commissioner, the Secretary is authorized to designate an officer or employee of the Treasury Department to act as commissioner, in order that there will be at all times an officer having power to perform the functions of the commissioner.

Subdivision (*b*) of Section 2 authorizes the Commissioner of Narcotics, subject to regulations by the Secretary of the Treasury, to confer or impose upon officers or employees of the Bureau of Narcotics any of the rights, privileges, powers or duties of customs officers.

Under subdivision (*a*) of Section 3 the Federal Narcotics Control Board established by the narcotic drugs import and export act is abolished, and all of the authority, powers and functions of the board are vested in the Commissioner of Narcotics. The Federal Narcotics Control Board as now established is composed of the Secretary of State, the Secretary of the Treasury and the Secretary of Commerce.

Under the act entitled "An act to create a Bureau of Customs and a Bureau of Prohibition in the Department of the Treasury," approved March 3, 1927, the administration of all laws relating to narcotic drugs imposed upon the Commissioner of Internal Revenue, his officers and agents was imposed upon the Secretary of the Treasury. He in turn was authorized to delegate any of such rights, privileges, powers and duties upon the Commissioner of Prohibition. Subdivision (*b*) of Section 3 authorizes the Secretary to confer or impose any of such rights, privileges, powers and duties upon the Commissioner of Narcotics or any officer or employee of the Bureau of Narcotics.

Under subdivision (*c*) of Section 3 the office of deputy commissioner in charge of narcotics of the Bureau of Prohibition is abolished and the Secretary of the Treasury is authorized to transfer to the Bureau of Narcotics such personnel, except the Commissioner of Prohibition, the assistant commissioner and the deputy commissioner in charge of prohibition, and such records and office equipment, as may be necessary for the exercise by the Bureau of Narcotics of the functions vested in it.

Subdivision (*d*) of Section 3 authorizes the transfer of unexpended balances of appropriation from the Bureau of Prohibition to the Bureau of Narcotics. Subdivision (*e*) provides for the continuing in effect of orders, rules and regulations with respect to laws relating to narcotic drugs issued by the Commissioner of Prohibition or the Federal Narcotics Control Board. Subdivision (*f*) provides for the transfer of pending proceedings, investigations and other matters in the Bureau of Prohibition and the Federal Narcotics Control Board to the Bureau of Narcotics.

The effect of subdivision (*a*) of Section 4 is to change the name of the narcotics division in the office of the Surgeon General of the United States Public Health Service to the division of mental hygiene and to provide that the medical officer in charge of such division shall have the rank and receive the pay and allowances of an Assistant Surgeon General.

Subdivision (*b*) authorizes the Surgeon General of the Public Health Service to make studies and investigations of the abusive use of all narcotic drugs and of the quantities of certain narcotic drugs which are necessary to supply the normal and emergency medical and scientific requirements of the United States and of the causes, prevalence and means for the prevention and treatment of mental and nervous diseases. He is required to report to the Secretary of the Treasury on or before the first day of September in each year results of his investigations. Such results are to be made available to the commissioner of narcotics to be used by him in determining the amounts of crude opium and coca leaves to be imported under the narcotic drugs import and export act.

Subdivision (*c*) authorizes the appointment by the Secretary of the Treasury of such professional, technical and clerical assistants as may be necessary to aid the Surgeon General in making such studies and investigations.

Section 5 provides for an appeal from the Commissioner of Narcotics to the Secretary of the Treasury.

Section 6 amends the definition of "narcotic drug" for the purposes of the narcotic drugs import and export act in order to permit the importation into this country of decocainized coca leaves. The reasons for this provision are stated elsewhere in this report.

In order to aid the Secretary of State in discharging international obligations of the United States concerning the traffic in narcotic drugs, the Secretary of the Treasury, under Section 7 of the Bill, is authorized to coöperate with the Secretary of State.

In compliance with Paragraph 2*a* of Rule XIII of the Rules of the House of Representatives, changes in existing law made by Section 6 of the Bill are shown as follows: Existing laws proposed to be omitted is inclosed in brackets; new matter is printed in italics; existing law in which no change is proposed is shown in roman.

(*a*) The term "narcotic drug" means [opium, coca leaves, cocaine], *opium or coca leaves,* or any *compound, manufacture,* salt, derivative, or preparation [of opium, coca leaves or cocaine] *thereof, except that such term shall not include (1) coca leaves which do not contain cocaine, ecgonine, or any salt, derivative or preparation from which cocaine or ecgonine may be synthesized or made; (2) any salt, derivative or preparation of coca leaves which does not contain cocaine, ecgonine or any ingredient or ingredients from which cocaine or ecgonine may be synthesized or made.*

BOOK NOTICES AND REVIEWS.

Applied Pharmacology. By A. J. CLARK, Professor of Materia Medica and Pharmacology in the University of Edinburgh; Third Edition, Philadelphia, P. Blakiston's Son & Co., Inc., 1929, 529 pages.

The textbook before us commands the special attention of every one acquainted with pharmacology because it is written by the successor of A. Cushny, formerly professor of pharmacology at the University of Edinburgh and the author of what has been for many years the most widely used text on pharmacology in England and America. It is interesting to compare the treatment of the same science by Cushny and his successor.

Even a superficial examination of the compact, well-printed book of some five hundred pages reveals that the writer has attempted to give a succinct and, at the same time, up-to-date presentation of his specialty. A closer examination of the reading matter, however, discloses what is to be expected in case of every textbook in any department of science, that while "Applied Pharmacology" may be extremely up-to-date in some respects, it is regrettably inadequate in others and particularly when treating of matters with which the author has not had first-hand experimental acquaintance.

The method of classification in the present textbook is almost entirely a physiological one and follows the lines laid down by the well-known German work of Meyer and Gottlieb rather than those indicated by Cushny. The physiological subdivision of the various topics obviously presents many advantages, especially from the practical standpoint of therapeutics. On the other hand, it has its disadvantages because, under the circumstances, the treatment of some of the most important drugs must be scattered through the book. Thus, for instance, we find opium and morphine discussed piecemeal in at least four different chapters. Morphine is described in Chapter IX together with aliphatic narcotics. It is classed with delirifacient and habit-producing drugs in Chapter X. The opium alkaloids crop up again in the discussion of the pharmacology of the alimentary canal, Chapter XIII, and, once more, another cardinal indication for the therapeutic use of morphine and the related alkaloids requires treatment in Chapter XVIII, which deals with the pharmacology of respiration.

Clark's pharmacology embodies in its text, to the great gratification of the reviewer, several chapters on subjects of paramount importance, which have hitherto received but scant consideration in most of the recent textbooks of pharmacology. Perhaps the most important of these is Chapter XXVII which devotes sixteen pages to the pharmacological action of radiations. This subject, which we may term "photopharmacology," is, in our opinion, destined to play a greater and greater rôle in the development of pharmacological science. Here we have a brief but excellent description of the electro-magnetic radiations, ultraviolet light, radium radiations and X-rays, action of various radiations on living tissues, malignant growths, etc., and a general discussion of the therapeutic

applications of radiations, including heliotherapy, radiant heat and diathermy. Another novel and much needed chapter is that dealing with the pharmacology of the skin, which touches upon skin allergy, absorption of drugs through the skin, burns, depilation, new and interesting pharmacological properties of thallium, etc. Chapter XXIV, comprising nearly thirty pages, is devoted to endocrine glands. An attempt is made to present the latest knowledge on the subject but, of course, the author not being familiar with all the phases of the subject, presents some of them in a manner not quite satisfactory to those specializing along these lines. Here we have a discussion of the thyroid hormone, the parathyroids, insulin, active principles from the suprarenal glands, and finally, a discussion of the hormones of the ovary and testes. The writer seems to have been swept away by the undue emphasis recently laid on the follicular hormone at the expense of corpus luteum. The pituitary gland is treated partly in this chapter and partly in another dealing with action of drugs on the uterus. In connection with the special chapters, which are an excellent feature of the book, mention must also be made of the one on vitamins, that dealing with the actions of products of protein breakdown, and of the chapter entitled, "Inorganic Metabolism," which describes the inorganic ions necessary for life, the subject of water balance, etc.

To turn to the main body of the book, the first and second chapters deal with disinfectants and antiseptics. An attempt is made to cover briefly all the chemicals which have been used for such purposes and the author has included in his consideration of the subject some of the latest dyes, mercurials and other antiseptics introduced into medicine. Curiously enough, the use of chaulmoogra oil in leprosy is introduced in the second chapter although it belongs more logically to Chapter III, which deals with specific therapeutics. By specific therapeutics, Clark really means the great subject of chemotherapy to which Chapters III, IV and V are devoted. In Chapter III arsenic is considered from every point of view and, more particularly, in relation to the treatment of syphilis. In Chapter IV there is a description of mercury, bismuth and antimony employed as chemotherapeutic agents. Here also reference is made to iodides, Bayer 205, and several other drugs. In Chapter V the author presents an excellent but unfortunately rather brief discussion of quinine and emetine. The up-to-date tenor of the book is revealed by the fact that even such a new drug as plasmoquine is given some consideration. Following the treatment of chemotherapeutic agents is a chapter on anthelmintics.

With Chapter VII the writer begins a discussion of drugs acting on the central nervous system. Here twenty-two pages are devoted to alcohols and contain much useful information, the subject being treated throughout in a thoroughly impartial, scientific manner. Chapter VIII is devoted to the general anæsthetics, including ether, chloroform, nitrous oxide, ethylene and combined anæsthesia. The treatment of anæsthetics embodies a great deal of new and extremely valuable information, not only of pharmacological but of physiological and biochemical nature as well. Chapter IX deals with depressants of the central nervous system and mixes together rather illogically a treatment of such diverse pharmacological agents as magnesium, bromides, analgesics, the aliphatic narcotics (such hypnotics as chloral, sulphonal, luminal, urethane, veronal) with morphine and hyoscine. For those who are not particularly interested in the therapeutic aspects of pharmacology, this conglomeration is a hard one to swallow. In Chapter X, entitled, "Stimulants and Habit-Producing Drugs," to the amazement of pharmacologists of the older school, are lumped together strychnine, camphor, cocaine, morphine, alcohol and hashish, with tobacco thrown into the bargain. In Chapter XI is given an excellent presentation of local anæsthetics embodying a great deal of recent work and their comparative efficiency as well as toxicity. We note with gratification a reference to the most important article on local anæsthetics compiled by the Committee of the American Medical Association under the chairmanship of Dr. Emil Mayer, whose name, incidentally, is spelt incorrectly in the literary references on page 198. Chapter XII, "Specific Action of Drugs on Nerve Endings and Counter-Irritants," is another which will grate upon the nerve endings of certain classical pharmacologists. It is certainly far-fetched, however useful it may be from the therapeutic point of view, to discuss the whole subject of sympatico-mimetic drugs such as adrenalin, ergotoxine, pilocarpine, physostigmine, atropine, hyoscine, choline, etc., with cantharides, mustard and other counter-irritants and rubefacients and append to the foregoing a brief

paragraph on aconite and a few pages on the pharmacology of the eye and of glaucoma.

One of the finest portions of Clark's "Applied Pharmacology," are the three chapters dealing with the pharmacology of the alimentary canal. These are well worth reading and comprise the latest scientific, pharmacological and therapeutic contributions on the subject, beginning with the functions of the salivary glands, and emetics, passing to the treatment of gastro-intestinal secretions and motility, and concluding with the complete pharmacological discussion of the effects of purgatives, sedatives and other drugs affecting the intestines. Of equal excellence are the two chapters devoted to the pharmacology of the circulation, the first of which, Chapter XVI, deals more particularly with the therapeutics of the heart, and the second with the effects of drugs on the blood vessels. Here, again, some of the latest scientific information on the subject is incorporated. The pharmacology of the respiration is taken up in Chapter XVIII and a large part of this chapter is devoted to a discussion of the fundamental physiological laws governing the respiratory function which must always be considered before a study of respiratory pharmacodynamics. Chapter XIX contains the usual treatment of the pharmacology of the kidneys, including a consideration of diuretics, kidney irritants, action of digitalis on the kidneys, relation of internal secretions to kidney function, etc. Chapter XXI gives a brief account of the principal drugs acting primarily on the uterus.

Considered as a whole, "Applied Pharmacology" is one of the best textbooks for its size written on the subject of pharmacology based primarily on experimental investigations. It is up-to-date; its style is very attractive; the illustrations, tables and graphs are novel and illuminating; and a carefully selected list of references, while not comprehensive, will be found useful by the student of a subject which is yearly gaining in importance.—*D. I. M.*

Colloid Chemistry, Principles and Applications, JEROME ALEXANDER, M.Sc. Third Edition, pages x + 270. D. Van Nostrand Co., Inc., N. Y., 1929. Price $3.00.

This work is a revision of two previous editions, brought to date by the inclusion of the most recent developments in Colloid Chemistry. Even though encyclopædic in its scope, the book is at best only a popular presentation of the subject. The variety of titles dealing with the practical application of the basic concepts of Colloid Chemistry is such that each receives but scanty treatment.

The text material is divided into 14 chapters; the appendix contains 16 pages devoted to Experimental Suggestions or Laboratory Manual, also a bibliography of English, German and French reference material. A brief glossary is also given, and the index is divided under the heads of Authors and Subjects.

Authoritative references are parenthesized throughout the reading matter instead of being appended as footnotes. The writer waxes poetical throughout the work and has quoted and invoked all and sundry from Shakespeare up to the moderns. In short, one who approaches this volume with anticipations of securing technical data in a straight-forward scientific manner is doomed to disappointment.

The book is a unit of the Industrial Chemical Monographs recently inaugurated under the editorial supervision of E. W. Lee Lewis and H. E. Howe.—SIMON MENDELSOHN, Cincinnati, Ohio.

NARCOTIC CONTROL DRIVE WORRIES SWISS PRODUCERS.

Significant comment on the attitude of Swiss manufacturers of narcotics toward efforts to curtail illicit traffic in these drugs is contained in the following item which appeared in the *New York Times* as a wireless dispatch from Geneva:

A round-up of drug traffickers by the London police, combined with recent restrictive measures taken in America, is causing great anxiety to the wealthy proprietors of the big chemical factories at Basle, which supply 55 per cent of the world's drugs, especially cocaine and heroine.

The drugs, which are smuggled by groups with which they have no connection into North and South American ports on special subsidized vessels, are disguised in many ways and distributed on a large scale to the principal dealers, who in turn engage a small army of men and women of the underworld to keep night clubs and disorderly houses well stocked.

The Swiss government, owing to the inadequacy of existing regulations, has little control of Swiss drug exports, but a new and stricter law is under consideration as a result of protests from other nations. It is estimated that the drug traffic produces a profit of 700 to 800 per cent.